

# Chemical Age

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Jul 1957

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(page 1003)

VOL. 77 No. 1979

15 June 1957

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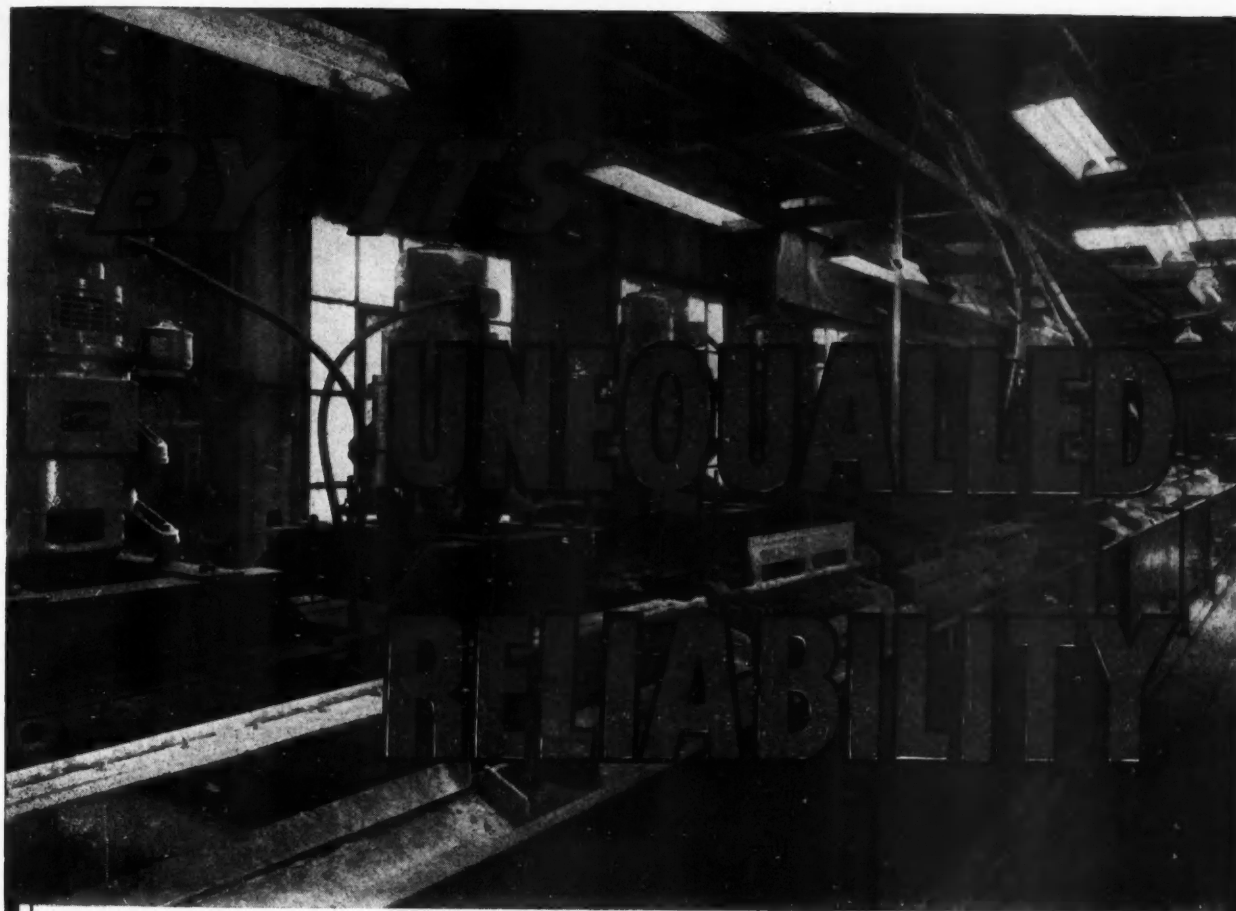
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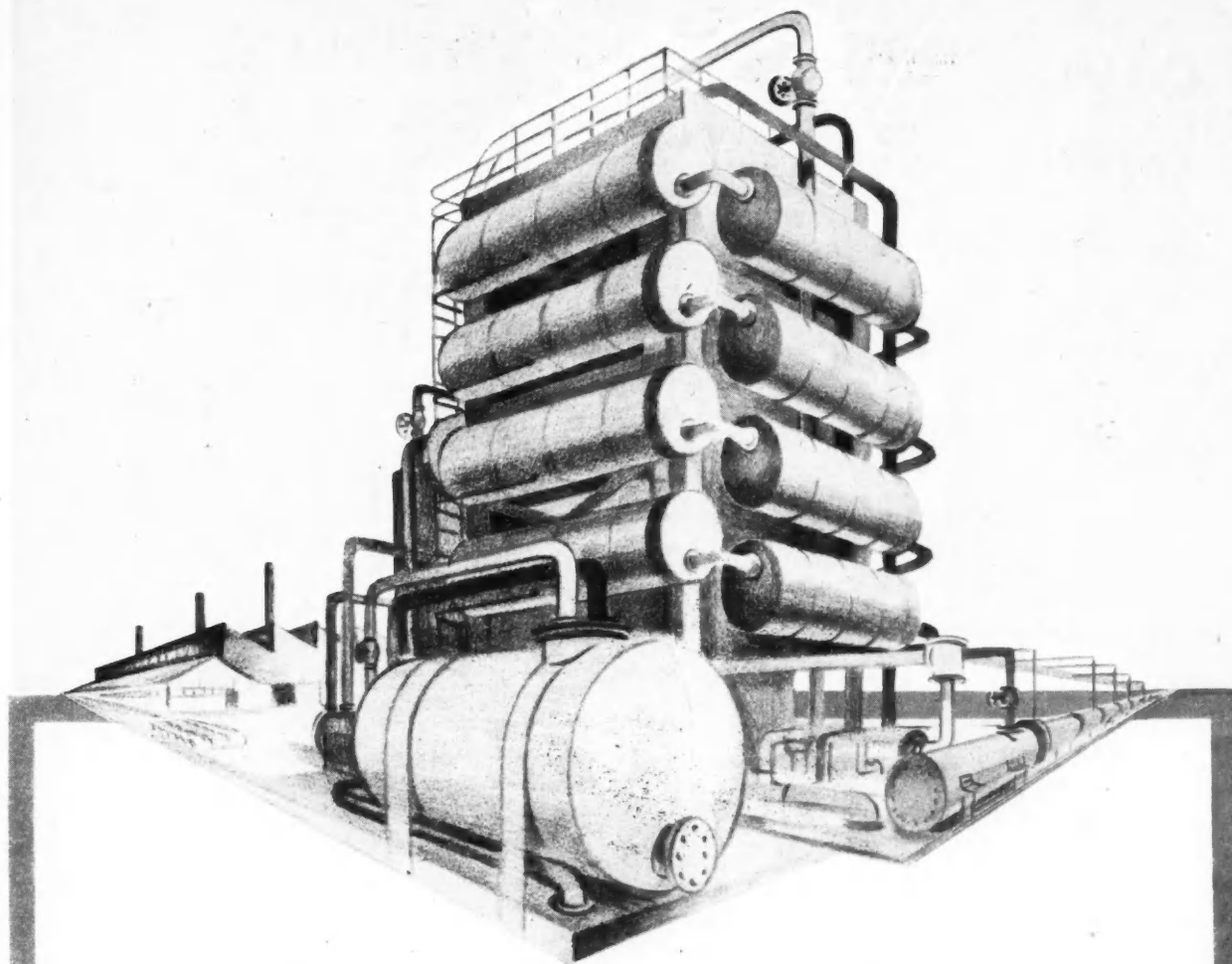
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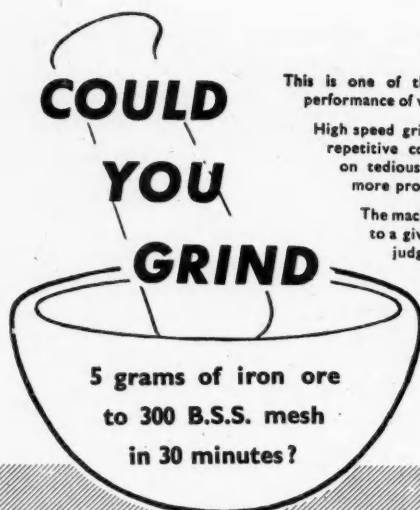
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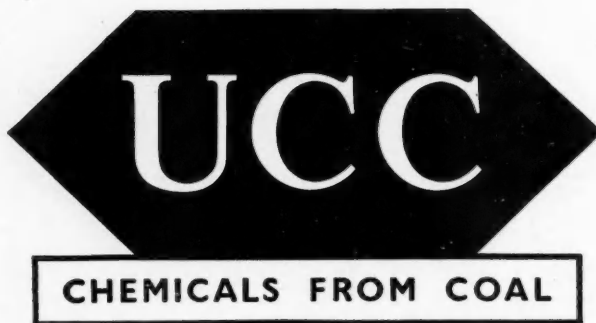
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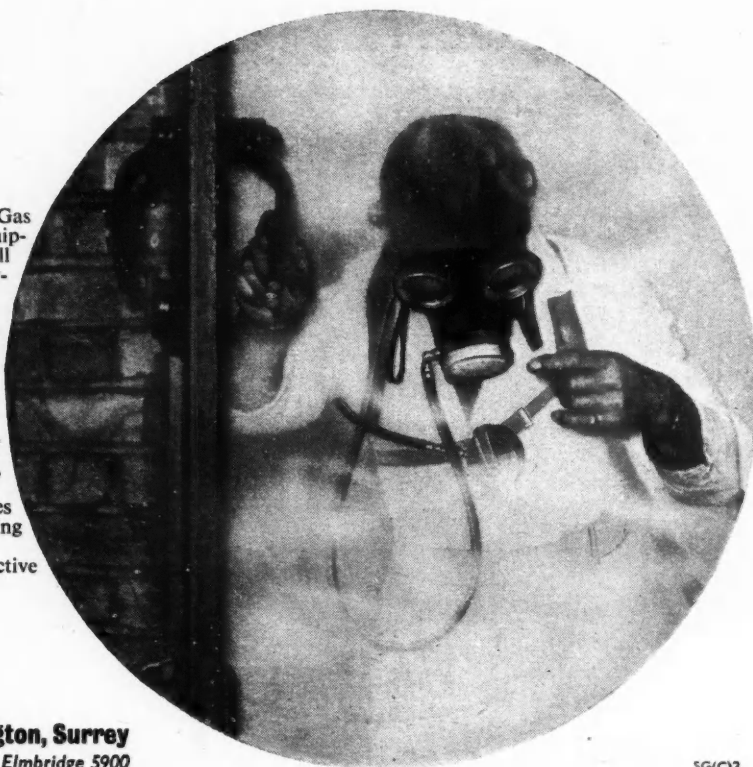
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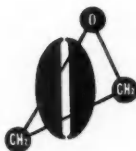
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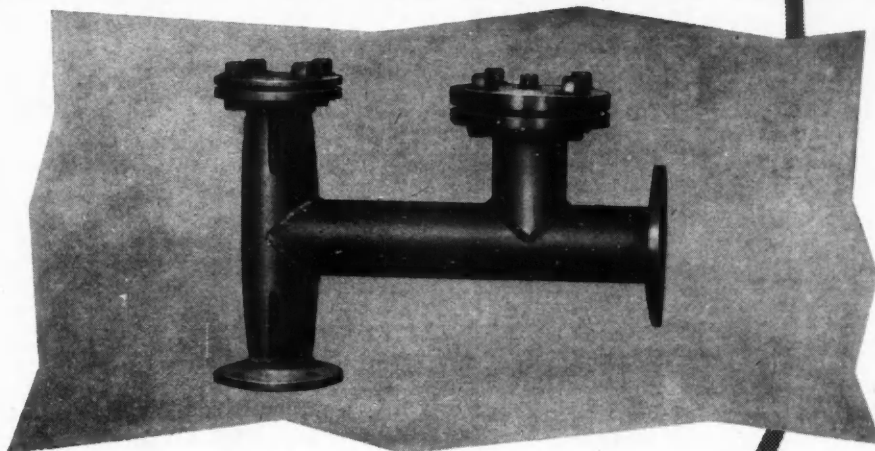
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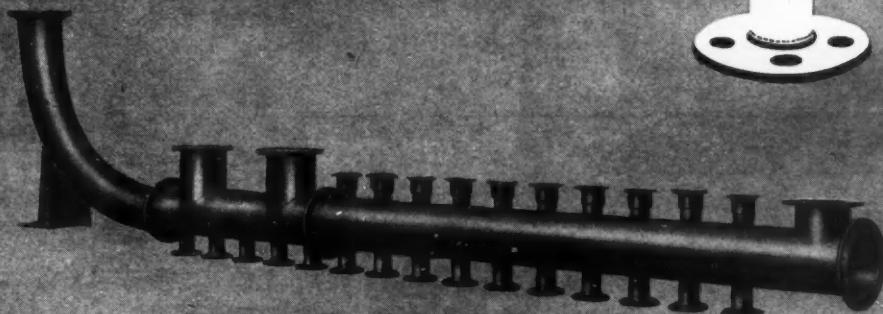


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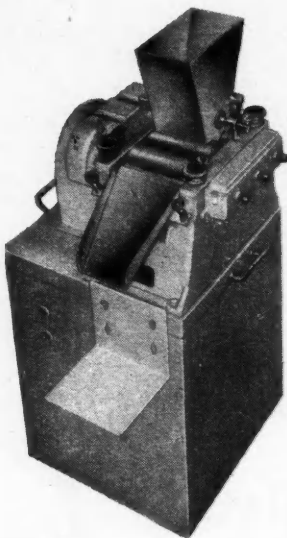
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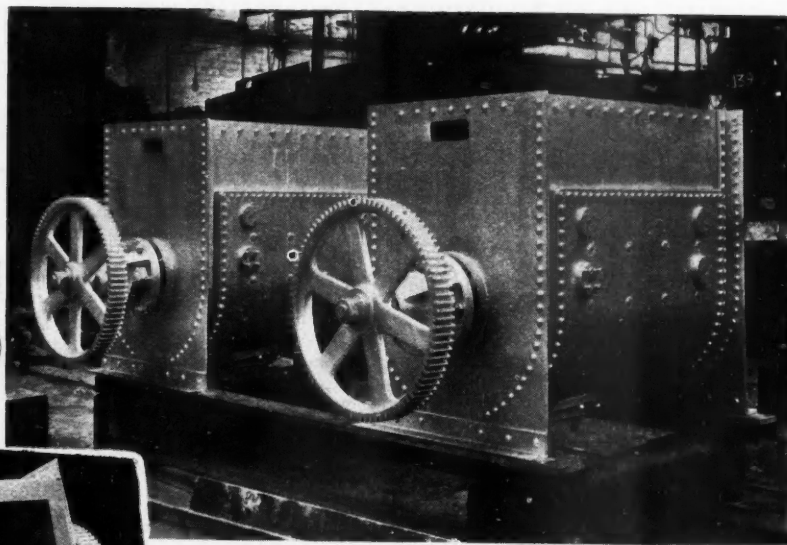
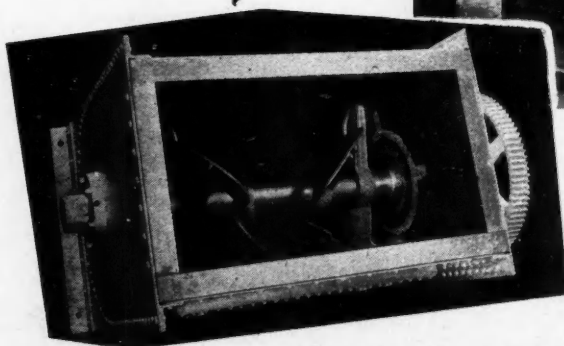


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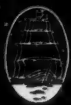
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# CHEMICAL AGE

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## AGRICULTURAL CHEMICALS

**A**GRICULTURE means big business for chemicals now that farmers are finding that it pays to buy fertilisers, insecticides, fungicides, seed treatments, herbicides, rodenticides and livestock treatments; so enabling them to obtain greater crop yields and better, healthier livestock.

Until recently, advances in the application of science to the agricultural industry have been slow. This has undoubtedly been due to the lack of interest on the part of farming communities to do more than modify slightly age-old empirical farming methods. Now the progress steadily being made in understanding plant nutrition is resulting in better, more useful and economic fertilisers etc.

An example of what is possible by the use of fertilisers is that 150 lb. of sulphate of ammonia, which is equivalent to 30 lb. of nitrogen, spread on an acre of paddy rice will increase the yield 50 per cent. Every country of the world with the exception of Japan and the Netherlands can increase its food production by about 50 per cent through use of the right fertilisers.

Concern has been felt in the agricultural chemical industry regarding the over capacity now existing for anhydrous ammonia. Both in Europe and the US, production of nitrogen has been rising faster than consumption. A large ammonia producer (Monsanto Chemicals) of the US, indicated in its annual report that lowered sales of ammonia had reduced the company's net income during 1956. However, this situation now appears to have changed for the better as far as the US is concerned, with the ending of the drought and increased water levels (see Overseas News, p. 1013).

World production of nitrogenous fertilisers is estimated to have been of the order of 7.3 million tons of nitrogen in 1955-56. In 1956-57 capacity is estimated to increase by about 1.4 million tons—almost 20 per cent of the 1955-56 production and since projects announced for the following years amount to 1.8 million tons, a further increase of 24 per cent over world production in 1956-57 will occur. Consumption is unlikely to rise at this rapid rate, although there are reports now of farmers becoming more and more keen to use high nitrogen compounds. Over-capacity seems inevitable, however, even with increased usage, and adequate measures will have to be taken to open up new markets. Possibly completion of projects can be spread over a longer period.

On the sales side, competition in nitrogenous products on world markets is increasing, particularly from the US. Also, overseas countries which used to import nitrogen from Europe are now tending to produce nitrogen themselves.

Here it is interesting to record that the UK nitrogen subsidy for 1957 has been steeply increased following the rise in productive capacity with a view to stimulating consumption.

Increased industrial usage seems to offer most hope for nitrogen and ammonia over-capacity. It is known that in the US companies are carrying out considerable research into new applications for ammonia outside of the agricultural field.

International interest in potash developments has been high. The situation in North Africa has obviously had its effects. News therefore that large

potash beds which underlie much of Saskatchewan are now being developed has produced promises from British and German producers to market potash in Europe and, in due course, wherever dense population has depleted the soil of this important ingredient.

Rate of increase in production of potash fertilisers for the current year 1956-57 has been estimated at 6 per cent, although there seems to be a tendency for production to be levelling off compared with previous years. The trend now is for more highly concentrated potash salts.

With regard to phosphatic fertilisers, preference is now for the higher concentrated forms of superphosphate complex and compound fertilisers, all of which require careful preparation and packaging.

Pest control chemicals appear to be viewed optimistically by concerns engaged in producing these. Use of insecticides is pretty well accepted, but it is predicted considerable increases in sales of these chemical compounds will occur. Still the largest seller is DDT, with malathion a good second. Other organics with large sales are aldrin lindane and chlordane.

Crop-conscious farmers are reported to be becoming fungicide conscious. Copper and sulphur sprays continue as large volume sellers, with increasing interest in mercurial compounds, dithiocarbamates and other new organic compounds. Farmers have also found that fungicide for protecting seeds have proved an excellent insurance against crop loss, while the cost per acre is not uneconomic.

Since the war years, also, animal treatments have expanded. Medicated feeds for coccidiosis have aroused considerable interest and have introduced new fields of applications for sulphonamides and antibiotics. These latter are being used with spectacular results in fattening poultry, pigs etc., and, of course, at the same time provide an excellent outlet for the increased production and hence greater output of antibiotics required by economic considerations.

Preparations for deworming livestock have gained considerable impetus from the discovery of piperazine compounds which are simple to administer and are virtually non-toxic.

An important part is now being played in agriculture by herbicides. The market for 2, 4-D, introduced some ten years ago, is still expanding. MCP usage appears to have increased over the past three years. The newer CMU and amino-triazole are proving useful, while chloro-N-N-diallyl-acetamide is thought to hold considerable promise for control of wild oats, flax and barley.

What latest chemical compound appears to hold out interesting promise? It is suggested that gibberellic acid is the chemical of interest at the moment. Development in the US for the large-scale manufacture of this plant-growth preparation is well under way and limited trial samples are known to be under test in this country. Plant hormones hold out considerable promise. However, much basic physiological knowledge on plants etc., is required. Plant physiology studies will, therefore, have to be carried out concomitant with chemical research.

## POLYETHER RESINS AND PTFE

DEVELOPMENTS in the polyether resin field are viewed with interest. Considerable experience with these plastics appears to have been gained in the US by the Hercules Powder Co., from which company limited pilot scale quantities are now available of one particular type. Germany also appears to be interested in polyethers, on which a note is published in the latest issue of *Chemische Industrie* (May, p. 233).

Starting material for the polyethers is pentaerythritol or its derivatives which are converted into derivatives of trimethylene oxide. These, in the presence of boron fluoride or some other Friedel-Crafts' catalyst are polymerised to polyethers, the chain components of which are substituted pentaerythritol molecules.

These polymers are highly crystalline and thus have a high melting point (3, 3-bis-chlormethyl derivative melts at 185° C. and the 3, 3-bis-hydroxymethyl derivative at 280° C.).

Mechanical properties of the polyethers have been examined and tensile strength is 400-500 kg./cm<sup>2</sup>. It is of interest to note that the mechanical properties are practically constant over a wide range of temperatures, including low temperatures. Moisture absorption is minimal (0.01 per cent at 25° C. after one day, and even after a week it is only 0.09 per cent).

Polyethers are stated to be outstandingly resistant to hydrolysis and the 3, 3-bis-chlormethyl polymer is largely incombustible. Electrical properties are reported to be considerably better than polyamides.

Judging from these properties, polyethers would appear to have a wide field of applications. They could be particularly suitable as insulating materials for refrigerator motors and other temperature-resistant insulation. In addition they could be used as water-proof packing materials and for all types of weather-resistant materials of construction.

A very important property is that these resins can be worked by extrusion and injection moulding methods.

In the US, Hercules Powder Co. have developed Penton, a chlorinated pentaerythritol. Production is on a pilot plant

scale at present, and experimental quantities only are available. According to the report in *Chemische Industrie*, development in the UK is being carried out by Imperial Chemical Industries Ltd., but has not yet passed the laboratory stage. ICI are undoubtedly following the developments relating to the polyethers, since these resins have many of the properties associated with p.t.f.e. (polytetrafluoroethylene, Fluon ICI). ICI also produced pentaerythritol. They do not, at present, make a chlorinated pentaerythritol.

The polyether resins undoubtedly offer notable desirable properties and advantages when compared with polytetrafluoroethylene (known also as Teflon, Dupont, in the US, and Hostafon D, a Hoechst resin (a tri-fluoro-mono-chloroethylene), in Germany).

P.t.f.e. is regarded from the technical point of view as the most outstanding plastics material. It offers a most desirable range of properties—resistance to chemical attack, high and low temperature resistance, low co-efficient of friction, a marked non-stick property and high electric values.

In its chemical resistance, p.t.f.e. is, in fact, completely resistant to all solvents and to all known chemicals except molten alkali metals, fluorine at high temperatures and certain halogen compounds such as chlorine trifluoride. While the extreme inertness of p.t.f.e. is a very desirable property in so many ways, this plastics material has proved very difficult to work. Thus, it has poor flow properties while its behaviour at high temperatures is such that normal fabrication methods are impossible. At high temperatures, p.t.f.e. gives off traces of vapour which, if inhaled, can produce untoward results for personnel engaged in processing it. At 327° C. it undergoes 25 per volume increase and care is required to produce successful moulding at this temperature since it is 33° to 35° C., below its processing temperature.

Unlike the polyethers, which have been found to have chemical resistance of the same order as p.t.f.e., this latter material cannot be injection moulded or extruded without sintering. Sintering has to be carried out at 360° to 380° C., with its inherent vapour dangers, and preforming at room

(Continued in Page 1004)

# CUTTING COSTS BY FUEL EFFICIENCY

## NIFES Case Histories Reviewed

**I**T IS now three years since the National Industrial Fuel Efficiency Service, more usually known as NIFES, was set up to help industrialists to use their fuel more efficiently. The service, having taken over the work which before May 1954 was the responsibility of the Fuel Efficiency Branch of the then Ministry of Fuel and Power, exists solely to give advice to industrial and commercial fuel users on the most efficient and economical use of all forms of fuel, heat and power, and has no powers of compulsion. It can only advise if asked to and hope that industry will make full use of the expert services which it offers. These fall into four main categories.

### Four Categories

The first aid service is limited in scope to a visual assessment of the firm's fuel problems, but it affords the trained engineer an opportunity of finding out where heat is obviously running to waste so that he can decide how the wastage can be avoided.

This type of advisory visit also provides the engineer with the chance of estimating the possibilities of further and more detailed investigation which will result in additional fuel saving.

The second category is the heat and power survey. This is the best method of putting the detailed investigation into effect, for it enables the engineer in charge of the survey team to work out the heat and power utilisation throughout the works and to decide the minimum quantity of fuel and power required for the manufacture of the product.

By accurate measurement, obtained by the use of the appropriate instruments which NIFES provide and install, it is possible to recommend methods of reducing the escape of heat, indicate how heat required by individual processes can be reduced and suggest ways in which worthwhile fuel saving can be achieved.

An example of the usefulness of this service is provided by the case of the British Rayophane Ltd., at Wigton, Cumberland, who manufacture viscose film.

In 1950 the firm consulted the Ministry of Fuel and Power engineers about increasing their operating efficiency. As a result of implementing their recommendations, fuel consumption per annum dropped from 12,974 to 11,540 tons by the end of 1951, a saving worth more than £4,000 at prices then ruling.

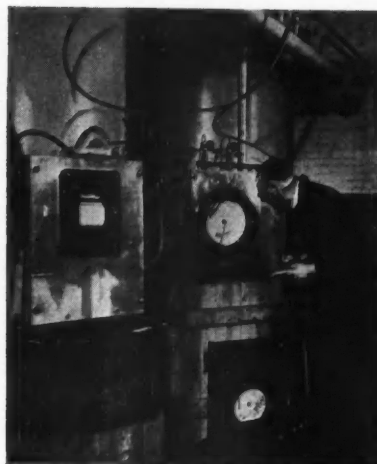
Subsequently NIFES were called in to determine the heat losses and requirements of the factory. It was discovered that where at one stage of processing the viscose film passed several times through baths heated with steam, a heat loss three times as great as that from the

surface of the bath itself was taking place. Measurement of steam flow showed that an additional 100 tons per annum of coal was required for every 1°C excess above the minimum and the firm may ultimately save 1,000 tons of fuel per annum by lowering the temperatures and by improved temperature control.

Although Britain has used fuel oil extensively during the past few years to help bridge the gap between supply and demand of fuel, the recent Middle East crisis emphasised the country's close safety margin where fuel supplies are concerned. But the picture is not an entirely gloomy one. The National Industrial Fuel Efficiency Service, founded three years ago, shows the chemical industry how fuel can be made to do more work. This article, specially written for 'Chemical Age' by a NIFES expert, illustrates, with case histories, the service offered to industry by NIFES

Another firm which gives constant attention to fuel efficiency is the BB Chemical Co. Ltd., of Leicester, who have made considerable improvements in the generation and usage of steam at their works.

At a time when increased production requirements caused the steam demand to rise by more than 25 per cent, their coal consumption was reduced by approximately eight per cent. This was achieved by plant improvements which included the installation of an economiser, sprink-



NIFES engineer reading instruments in boilerhouse

ler stokers, boiler instruments and automatic control of feed pumps. In addition, attention was paid to lagging, condensate return, air venting of boiling pans, roof insulation of new buildings and the reduction, wherever possible, of steam pressures which could then be used for space heating.

Aware, however, that steam demands were continuing to increase and that the boiler capacity was being reached, the management asked NIFES to make monthly visits under a regular service agreement to investigate the possibility of increasing the efficiency of the plant still further and to ensure that the highest standards of maintenance and operation were constantly applied.

Recently, by attention to brickwork, including painting over all external brickwork with a factory waste product, air leakage has been substantially reduced and flue loss cut down by five to six per cent.

Regular service agreements form the third category. This service, one of the most popular which NIFES offer, was instituted to help firms, like the BB Chemical Co., who have achieved a high standard of efficiency and realise that it



NIFES instructor explains the types of instruments used in the boilerhouse and the functions of each. Often these instruments are not understood by the stoker, although they are an important part of his daily work



*NIFES engineer points out to a dye-house manager the considerable wastage of steam from the unenclosed dye vat*

is essential to keep a close watch if the standard is to be maintained. It is achieved by the use of regular engineer visits to check on operating efficiency.

The service has no fixed pattern; it is completely adaptable to the consumer's needs. But whether it is by monthly or quarterly visits, NIFES engineers keep a continuous check on operating standards and discuss the consumer's day-to-day problems with the staff.

Fourth category is the boiler operators' training scheme. This is a correspondence course, coupled with practical instruction on-site by a trained NIFES engineer. The boiler operators are trained to the standard of the Boiler Operators' Certificate of the City and Guilds of London Institute.

Fundamentally the training of these men is one of NIFES' most important tasks, for an untrained stoker wastes considerable quantities of fuel and often causes heavy smoke emission at the same time. Despite this, it is estimated that less than 10 per cent of the boiler operators in this country have had really effective training for their job, which means that more than 60,000 men are firing boiler plant by 'hit or miss' methods. Fuel efficiency should be brought to a high standard in all cases but no-one will get far if the man who uses the fuel in the first instance has very little idea of the right way to do his job.

Courses of training for boiler operators have been held at technical colleges for many years, but have not been well attended. NIFES' course was, therefore,

designed to attract the man who is prepared to give up some of his leisure to study correspondence material but cannot be induced to attend evening classes at a technical college. Employers must also play their part by allowing their men to take eight days off from their normal duties during the 21 weeks of the course to receive on-site training. This is given on plant similar or identical to that which the men normally use.

Results have been encouraging. Since the course started some 18 months ago, approximately 1,800 men have been trained. Of those who complete it and sit for the City and Guilds boiler operators' examination, over 80 per cent pass. It is optional whether the men sit the examination after training but, if they do, all the arrangements are made for them by NIFES.

Men who have received training have developed a new and keen interest in doing their job efficiently. They have also found it less exacting physically, for knowing how to do it properly means, literally, that the stoker's job is lightened.

The fact that NIFES' work is continually increasing in volume indicates that industrialists are finding out for themselves the benefits which accrue from the application of fuel efficiency methods. In addition to a saving in a vital raw material, the firm benefits financially.

Those who have not yet asked for NIFES' help and who are interested can obtain details of the nine area offices from the head office at 71 Grosvenor Street, London W1.

## Research Association's PVC-Steel Laminate Project in Pilot Production

OPEN days of the British Iron and Steel Research Association's Swansea laboratories have been changed slightly to Wednesday 19 June and Friday 21 June. As announced previously, one of the most important displays will be the p.v.c. steel-laminate project. Developments have reached an advanced stage and the recently installed pilot line is now producing limited quantities of continuously laminated strip for subsequent user trial.

The laminate combines the decorative and durable finish of p.v.c. with the strength of steel and being capable of severe deformation—it can be bent,

crimped, sheared or even deep drawn—it has a wide range of manufacturing applications. The material can be produced in many colours and with either a plain or an embossed surface.

A similar laminate is already on the market in the US. American efforts, however, have been mainly directed towards the production of separate laminated sheets, while BISRA's work has been directed to the development of the continuous strip process and to improving the laminating process.

Those wishing to attend the open days should contact the association's information officer at 11 Park Lane, London W1.

## POLYETHER RESINS AND PTFE

(Continued from Page 1002)

temperature is required. For some complicated shapes and thick sections, sintering under pressure may be required. Shrinkage of five to 10 per cent may occur.

Sintering this plastic requires a careful regulated cooling cycle. If cooled slowly at room temperature, mouldings become brittle with low elongation. If the moulding is quenched, a tougher and more ductile material is obtained but with some distortion.

No satisfactory adhesive for p.t.f.e. is known other than welding at a temperature of 400° C. and a pressure of 150 lb. per sq. in. for a few seconds. It cannot be stuck to other materials, although it is believed that a method is being tried in the US of applying liquid sodium metal and anhydrous ammonia to the plastics surface to enable it to be applied.

Having regard to these difficulties of working p.t.f.e., comparison of its properties with polyethers is interesting. Tensile strength of p.t.f.e. is 2,000 lb./in.<sup>2</sup> (140 kg./sq. in.), that of polyethers is 400-500 kg./sq. cm. P.t.f.e. is stated to be resistant to moisture. Tests on polyethers show minimal absorption (see above). The dielectric constant of p.t.f.e. is given as 2; that of polyether Penton is of a similar order. Volume resistance of p.t.f.e. is 10<sup>10</sup>-10<sup>21</sup> ohm/cm., that of polyethers 10<sup>15</sup> ohm/cm. Dielectric strength of p.t.f.e. is 200 volts per mil. 1/16 in. sheet, while that of a polyether is 400 volts per mil.

The price of p.t.f.e. has been high until recently—since yearly production was of the order of 20 tons a year. Capacity has now been increased to 200 tons per year, and the price of the granular polymer varies between £2 and £2 2s per lb. according to quantity ordered. Dispersion polymer (16 per cent) cost £3 5s and £3 7s per lb.—again according to quantity. In Germany, the price of the Hoechst product is similar. The price factor will therefore be of importance for polyethers.

While having many similarities with p.t.f.e., advantages of the polyethers from present information, are that normal methods of fabrication can be applied, electrical properties are similar, as also resistance to chemical attack and moisture. It is not known whether dangerous vapours are emitted during heating of polyethers, or whether there must be very scrupulous cleanliness during production, as is required for p.t.f.e. due to this polymer's affinity for dirt, which reduces its electrical characteristics and can cause wastage of this costly material.

# OBTAINING FRESH WATER FROM IMPURE SOURCES

## Processes and Research Described

**T**HE PRESENT position and future prospects of the preparation of fresh water from salt water, on which attention at the present time is focused, is reviewed by Mr. D. Neville-Jones, Intelligence Division, Department of Scientific and Industrial Research, in the Quarterly Journal of the Colonial Products Laboratory (1956, Vol. VI, No. 1).

As was recently stated in Parliament, consumption of water in Britain is expected to be double in 1970 what it was in 1938. In the US it is expected to double between 1950 and 1975.

Since in some areas only salt or brackish waters are available, suitable methods for preparing fresh water from such waters are being investigated. In *CHEMICAL AGE*, 25 May, p. 888 mention was made of co-operative research into demineralisation under the aegis of OECC.

### Methods Available

As Mr. Neville-Jones states, the only demineralisation processes at present available commercially are ion-exchange and distillation, although electrodialysis with ion-exchange membranes is on the verge of full commercial exploitation. This latter is only applicable economically to raw waters containing one or two thousand parts per million of salts, or less (sea-water contains about 30,000 p.p.m.).

In the distillation process, the various ways of economising in the use of heat, which is an expensive commodity, have given rise to the different types of distillation plant. There is the multiple effect plant, where heat given off by the condensing steam is used to heat water in a second evaporator, and so on until six effects are used. In the flash-type or vacuum distillation plant lower operating temperatures are used, vapour being 'flushed' from the water at temperatures below 100°C by the use of reduced pressures. The new Kuwait plant, which has an output of one million gallons a day, is of this type.

Vapour compression distillation plant makes use of the fact that compressing a vapour raises its temperature. Water in the still is raised initially to boiling point by immersion heating and the vapour produced is passed through a compressor and fed back into coils in the still where in condensing it gives up its heat and boils more salt water. Once in operation, the only energy required is that needed to run the compressor. Fuel costs are therefore the lowest of all these types of still. Capital cost, however, is higher. Previously only small ship board units were in operation but several fairly large land-based plants are now in use.

Considerations in choice of plant are fuel efficiency at the cost of more expen-

sive plants if fuel costs are high. Vapour compression gives the highest output for a given fuel consumption, but initial plant cost is twice that of an ordinary multiple effect plant. However, total costs per 1,000 gallons of water produced should still be the lowest. Economy of space, if important, also suggests vapour compression distillation. Maintenance, it should be noted, is rather more complicated. Largest land-based vapour compression installation of US manufacture has a total capacity of 200,000 gallons a day.

A practical difficulty with distillation plant is the formation of hard scale on heating surfaces, composed of the salts present in the water. This involves regular cessation of operations to remove scale with consequent loss of production time. Research in the UK has indicated the value of certain chemical additives to prevent scale formation. Free sulphuric acid or ferric chloride prevents most scale formation but has disadvantages such as careful control of acidity to avoid corrosion, giving rise to a tendency to foam in the evaporator etc.

Fundamental research now in progress suggests that certain chemicals affect condensation of steam on heating surfaces of evaporators increasing rate of flow of heat across the surfaces. This may lead to a reduction in heating surface area required, or that use may be made of low temperature steam from the tail-end of a turbine. Another possibility is reduced length of time for which the hot liquid is in contact with the heating surface thus reducing the amount of scale formed and the need for purely chemical treatment.

### Electrodialysis

Interest on electrodialysis using ion-selective membranes centres on the fact that this type of apparatus will produce water more cheaply than straightforward ion-exchange plants. Basic requirement is, of course, an electric current. Cost of water produced will rise with the concentration of the raw water, and above a certain level of salinity distillation becomes the cheaper process. The major uncertainty at present is the cost and life of the membranes, and the best types to be used.

According to Mr. Neville-Jones, the first British commercial pilot plant (capacity about 10 tons per day on raw waters containing 4,000 p.p.m.) is now being erected.

Processes in the research stage are solar distillation, separation by freezing, solvent extraction and other possible processes for desalting such as ultrasonics, utilisation of ocean temperature differences and osmotic processes.

The French, Mr. Neville-Jones reports, have developed a very practical form of solar still. It is of the simplest kind, the

base being made of asbestos cement covered with bitumen and the roof being made of glass, sealed in with a special putty. This still has been found to withstand best the very exacting climatic condition of such an area.

Cost of the solar still will depend on local manufacturing, transport and maintenance costs. The stills are made in units of about 1½ square metres in area. Three or four of these would be required on the roof of a house to provide drinking water for the family. The stills cost 15,000 francs per square metre in Algiers. Yield of fresh water varies from 1.5 to 2 cubic metres per square metre per year, depending on locality. Cost of 2 cubic metres per square metre, assuming the still has a life of 10 years, is 15,000 francs per annum, or 750 francs per cubic metre of water produced; that is rather less than £3 10s per thousand gallons. Lowest possible price may be half this figure if the still lasts for 20 years. Allowing for replacement costs (putty, glass breakage etc.), with a major overhaul after 10 years, a cost of the order of £6 per thousand gallons is estimated. Possibly competition could be from ion-exchange using raw water containing 4,000-5,000 p.p.m. of salts.

### Separation by Freezing

Separation by freezing has marked theoretical attractions since water is closer to its freezing point than to its boiling point, and because less energy is required to freeze water than to boil it. However, the practical difficulties of separating out the ice crystals formed as a continuous process or of removing economically the salt which adheres to the surface of the crystals, have not yet been overcome. Development work is being carried out in the US, and Israel has recently taken out a patent involving, so states Mr. Neville-Jones, a new approach to the problem and it is understood that a large pilot plant is to be erected in that country.

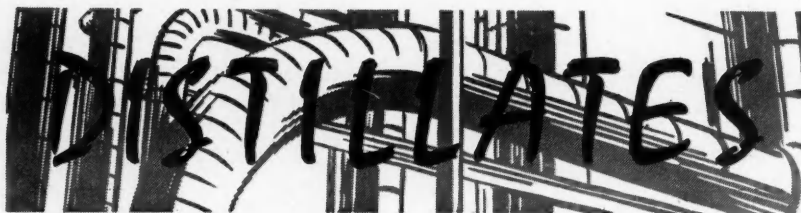
Preferential extraction by organic solvents which absorb fresh water from a saline solution, leaving the salts behind is another process of interest. Economic success of this process will depend on detailed chemical engineering work including effective ways of separating the fresh water from the solvent, and of recovering the solvent, which will be expensive, for re-use. Providing these problems can be overcome, Mr. Neville-Jones considers this process might prove competitive with distillation. Where fuel costs are important, the solvent extraction process becomes more attractive.

### Pfizer Exhibit at Poznan

PFIZER LTD., Folkstone, Kent, are the only British pharmaceutical firm exhibiting at the 26th Poznan International Fair.

Recently a Pfizer representative visited Poland and learned of that country's interest in Terramycin antibiotic. Within a week the decision to exhibit at the fair was taken.

During the fair a member of the company will present an ultra-microtome to Professor Aleksandrowicz, Professor of Haematology at Cracow University.



★ BRITISH chemical and other manufacturers will doubtless welcome the breathing space brought about by the postponement of the talks on the projected European free trade area. Of recent months, it appeared that this project was being pushed through to finality with what was almost an indecent haste. A project of this nature which will affect the whole economic climate of Europe as well as the individual positions of manufacturing concerns must be given a sound basis and that can only be accomplished if each step is carefully planned and negotiated.

The meeting of the OEEC Council of Ministers planned for July to receive reports on progress made since the last meeting in February, has now been put back to until 'as early a date as is practicable in the autumn.'

The hold up is due to a delay in the ratification of the common market proposals and the question is further complicated by the collapse of the Mollet administration in France.

★ REFERENCE to the serious difficulties facing British abstracting organisations, particularly in the chemical field, were made by MPs in the House of Commons Whitsun adjournment debate on scientific information services last Friday. Replying to concern expressed at the closing down of the Bureau of Abstracts three years' ago, Mr. H. Nicholls, Parliamentary Secretary to the Ministry of Works said that in 1953 DSIR offered a grant of £35,000 to keep the organisation concerned with chemical abstracts in being. It was not possible in the following 12 months to place the concern on a sounder financial basis.

Since then, we have been relying on the American abstract service and Mr. Nicholls maintained that the service and the quality of it left this country almost as we were when we had our own.

★ A FRENCH reader of Distillates is amused by references in CHEMICAL AGE and elsewhere to 'du Pont de Nemours.' In France, Dupont is as common a name as Smith is in this country and our correspondent, Dr. Maurice Moyal, says that du Pont have no right to the aristocratic particle 'du' as a separate word.

Dr. Moyal recalls that Pierre-Samuel Dupont was the member for the Nemours constituency in the Convention, the French Revolutionary Assembly which abolished all titles, including 'du' 'de' and 'des' and which paradoxically added a completely unofficial 'de Nemours' after the name of Pierre-Samuel Dupont solely for the purpose of distinguishing him from his colleague Jacques-Chalres Dupont, MP for the Eure district.

Dupont and his chemist son—Eleuthère-Irénée—were forced to migrate after the 18 Brumaire. Arriving in the US in 1799, they soon established a gunpowder mill at Wilmington. The Anglo-American war of 1812 brought the large Government orders, heralding the beginnings of the du Pont de Nemours family fortunes. But as Kipling said—that is another story.

★ ELSEWHERE in this issue our leader page deals with the growing world market for agricultural chemicals and our parliamentary correspondent reports the debate on a motion to approve the higher fertiliser subsidies in the 1957 draft fertiliser scheme. Alembic, however, records a voice in the wilderness.

The Thompson Chemical Corporation of St. Louis have decided to give up the production and distribution of industrial insecticides on the grounds that they are upsetting the balance of the predator-parasite insects. The company believe that the growing use of insecticides will cause an increase in numbers of what have been unimportant insects, to a point where they would become economic pests. It is also thought that insecticides could have serious effects on human beings.

The popular press frequently publishes ill-informed comments of a similar nature, but this is probably the first case of a chemical manufacturer putting himself out of business on account of them.

★ BY FAR the commonest kind of decay responsible for the present sad plight of many Oxford buildings is described by Lord Bridges and his appeal committee as 'blistering by chemical action.' Sulphur dioxide from the air has been reacting with the stone to form a 'skin' of calcium sulphate. A similar process used to attack the Houses of Parliament before the closing of the Lambeth potteries.

The surface reacts to changes of atmosphere more rapidly than the stone itself and in the end it falls off.

Headington free stone, used for walls and other exterior faces is particularly susceptible to this type of attack.

Initially the £1½ million restoration appeal is being aimed at just over 60,000 graduates, but Alembic is assured that the Oxford Historic Buildings Appeal, 18 Museum Road, Oxford, will welcome donations large and small from all lovers of Oxford.

★ THE QUEEN'S English can take many strange forms but Alembic had no hesitation in awarding his brickbat of the week for the following extract from British patent applications:

'... the components of a mixture to be separated are dissolved in a suitable

solvent (the first solvent) the solution is brought into intimate contact with a substantially immiscible solvent (the second solvent) which will preferentially extract one or more components from the solution, the extract is contacted with a phase obtained by stripping from the second solvent with the first solvent the component or components still held by the second solvent after contacting with the said phase, and a portion of the said phase is continuously withdrawn as a product.'

Alembic offers no prize for a correct solution.

★ WHERE does the money go—3? This week, Alembic puts the spotlight on Scottish Agricultural Industries of Leith. Their total income for the year ended 30 September 1956 was £24,189,262. Of that, 78.8 per cent was spent on raw materials and supplies; wages, salaries, pensions and general works and office expenses accounted for 14.8 per cent; taxes for 2.3 per cent; depreciation of equipment, 1.8 per cent; other additions to current capital needs, 1.3 per cent; dividends 0.7 per cent; amount set aside for workers' pensions, 0.2 per cent; interest 0.1 per cent.

★ THE HEAVY LEATHER industry has been going through difficult times in the past few years, due to rising competition from synthetic materials. This has also reflected on the trading position of the many chemical and allied firms that specialise in supplying leather producers. There has, however, been evidence for some time that this competition from other materials has reached its limit, if only for the time being.

This view is reinforced by Mr. G. d'Erlanger, chairman of the largest tanning extract group—Forestal Land, Timber and Railway Co. After exhaustive investigation of prospects over the next five years, the company has come to the fairly definite conclusion that on the medium-term view there is, on the whole, no reason to expect further major adverse developments.

Good use is to be made of this five-year 'breathing space' to find new uses for tanning extracts. In this development work, the organisation is backed by large well-equipped laboratories at Harpenden. These extracts already find uses in the ceramics industry and in the field of corrosion for the protection of pipes.

★ HOW MANY executives in the chemical industry can claim to bear the same name as a railway station? Alembic makes the bold claim that there is only one—Dr. James Craik, chairman of the Novel division of ICI Ltd. The name 'James Craik' also graces a station in the Argentine. This coincidence was spotted by Mr. E. M. Fraser, ICI sales controller and chairman of Plant Protection Ltd., when travelling in the Argentine.

*Alembic*

## MARKET IN BRAZIL FOR UK PESTICIDES

INFORMATION given in a report on the market for pesticides in Brazil by the commercial department of the British Embassy in Rio de Janeiro (Export Services Branch, Special Register Information Service, 30 May) indicates that most pesticides used in the country are formulated in local factories. Also, two of the chemicals most commonly used in the formulations, namely BHC (benzene hexachloride) and parathion, are manufactured on a sufficiently large scale to meet all national requirements.

Imports are still required, however, of DDT, copper sulphate and sulphur; of specialised or newly discovered chemicals of a proprietary value.

Two large factories in the State of São Paulo and one much smaller factory are manufacturing BHC of 12 per cent and 14.5 per cent gamma isomer content. Total productive capacity of the three factories is stated to be about 5,500 tons per annum compared with Brazil's consumption of 6,000 tons per annum. As soon as extra supplies of benzene become available, this small deficit will be made up. Brazilian manufacturers have, in fact, applied to the Foreign Trade Bureau for BHC to be removed from the list of chemicals imported under special conditions. If the application is successful, no further imports of BHC will be possible.

Local production of parathion is sufficient to meet all Brazil's requirements. It has now been excluded from the special auctions. Production is by one company, whose output is considered to be 250 tons a year, and is sold in proprietary mixtures at an average strength of 0.325 per cent.

Recently, malathion, which it is claimed is less toxic to human beings and animals than parathion has been imported from the US.

### New Projects

Only other pesticidal chemicals of any importance at present being manufactured in Brazil are carbon disulphide and arsenous oxide. DDT, now imported, is expected to be manufactured locally before the end of this year by the US Grace group. Initial production will probably be about 1,000 tons of 100 per cent material a year, a quarter of Brazil's requirements. Farbenfabriken Bayer AG is also expected to set up a factory to produce Metasystox, a systemic insecticide, already available in Brazil as an imported product.

Under the existing customs tariff, both prepared pesticides and chemicals required for pesticidal use are liable for negligible customs dues. Conventional rate for pesticides imported from the UK is Cr.\$0.14 per kilo. A draft of a new tariff is now being debated in the Brazilian Congress, which, if approved, will increase the rates as follows: most chemicals, 10 per cent ad valorem; prepared disinfectants, antiseptics, etc., 40 per cent; prepared insecticides etc., 20 per cent; and prepared herbicides (weed killers) etc., 4 per cent.

It is also believed that the Government will introduce modifications of the exchange auction system whereby certificates enabling the holder to purchase currency at the official rate of exchanges (Cr.\$18.82 to the US dollar) for the import of specified classes of goods, are sold at weekly auctions. Certificates for pesticides and fertilisers are offered at special auctions where the minimum premium is very low (Cr.\$25.00 to the US dollar) thus allowing the pesticides importer to purchase his requirements at about Cr.\$45.50 per US dollar of the c.i.f. price compared with the free market rate of about Cr.\$65.00 to the dollar.

If the present multiple exchange rate continues, it is believed that a reduction in the minimum rate of premium for the special agricultural auction will accompany the eventual introduction of the new tariff, thus leaving the overall cost of importing more or less as it is now.

### ICI Abandon Natural Gas Search

Imperial Chemical Industries Ltd. have abandoned their exploration for natural gas at Robin Hoods Bay, near Whitby, North Yorkshire, and operations are being transferred to a site on the Pickering-Whitby road at Sleights Moor. The bore hole at Robin Hoods Bay has been sunk to a depth of 5,378 ft., but only slight indications of gas have been found. ICI are carrying out the explorations in conjunction with the BP Exploration Co., a subsidiary of the British Petroleum Co. Ltd.

### Burnt Uranium Fuel Processing

RECENTLY the US Atomic Energy Commission released estimates of the cost of processing the burnt uranium fuel from nuclear reactor furnaces. These reveal that the cost of processing one ton of natural or slightly enriched fuel elements each day would be \$15,300. The plant envisaged in the estimates would process all types of fuel elements so far known to be planned or to be used in power producing reactors in nuclear power plants.

Cost of building a plant which would process one ton of burnt uranium fuel elements each day is likely to be \$20.6 million and the annual operating cost of the plant would be \$4.6 million.

Purified nitrate salts of uranium and plutonium would be produced. Conversion of unused uranium into gaseous uranium hexafluoride for further processing or conversion of plutonium metal would be an extra charge.

### Determination of Sodium Metaphosphate

A METHOD for the determination of sodium metaphosphate in very low concentrations is described in a leaflet published by Albright and Wilson. No suitable direct method of determining metaphosphate has yet been found. Metaphosphate may, however, be converted to orthophosphate by boiling in acid solution and the method described determines metaphosphate as the difference between the orthophosphate found in water on first sampling and that found after conversion of the metaphosphate. The method used is colorimetric based on the reaction between metaphosphate and molybdate. Accuracy is claimed to be about 0.1 p.p.m.

## International Conference of Benzole Producers



Delegates to the recent International Conference of Benzole Producers examining a display of raw materials and finished products in the sulphate of ammonia plant of the North Thames Gas Board's Beckton gas works. Left to right: W. E. Cartwright, secretary, National Benzole Association; Jean Bing, secretary, International Conference; F. A. Jackman and Dr. Thom, ICI Ltd.; L. W. Blundell, controller of by-products, North Thames Gas Board; M. Cuckney, chemist-in-charge, ammonia plant

## FREE TRADE PROPOSALS WILL INCREASE PRESSURE ON COSTS

### ICI's Central Council Meeting

THE UK chemical industry in general and Imperial Chemical Industries in particular are well placed to take advantage of the great opportunity that would be offered by UK participation in the proposed free trade area. This was stated by Sir Alexander Fleck, ICI chairman, at the recent meeting in the Royal Festival Hall, London, of the company's central council.

Sir Alexander said that continental manufacturers would not be slow to take up the challenge which meant there would be constant pressure on keeping down costs, but with enterprising and conscientious management and a skilled and conscientious labour force there was no limit to what could be achieved.

Europe was ICI's largest export region, taking £18,750,000 out of their total exports of £73 million. When the plan was first put forward, the UK with its protective customs duties over a wide range of imports and its system of imperial preference found itself in a dilemma. If we joined a common market, we should no longer be able to accord preferential treatment to Commonwealth imports nor could we expect to retain the benefits of preferential duties for our own exports to the Commonwealth.

If on the other hand we dissociated ourselves from such a project, the UK would be at a severe disadvantage compared with its keenest European competitors, particularly West Germany, as regards exports to the six common market countries.

That disadvantage would be particularly noticeable in trade with the Benelux countries which last year absorbed nearly half of the total UK exports to the 'six' and more than half of ICI exports to those countries.

#### Benelux Import Duties

Import duties of the Benelux countries were lower than the common rates of duty which would apply when the European customs union came into force. As a result a British exporter of organic chemicals to Holland would not only have to surmount a customs duty barrier higher than today, but would also have to compete against German products imported duty free.

That then was the background to the proposal that the UK should with other OEEC countries set up a partial free trade area to be associated with the common market. This wider area would result in a market of some 250 million people, 50 per cent more than the population of the US. From the expansion in production which might be expected to result, all the manufacturing countries should be able to benefit without doing so at each other's expense.

Referring to the fact that the rate of increase in international trade between the great producing countries had been

markedly higher than the rate of increase in trade between those industrial countries and the under-developed areas of the world, Sir Alexander said that trend also applied to ICI products. While the value of their trade since 1948 with relatively under-developed countries had increased by 68 per cent, their trade with industrially developed countries had increased by 240 per cent.

He added that the British chemical industry and ICI in particular should be well placed to take advantage of the projected free trade area.

#### New Laboratory for Steel Castings Research

THE NEW laboratory of the British Steel Castings Research Association opened last week at East Bank Road, Sheffield, by Sir Henry Jephcott, chairman of the Council for Scientific and Industrial Research, consists of an experimental foundry, a metallurgy room, a dust room, a

test house, a photographic section and an information department.

Including experimental foundry and offices, it has been built and equipped in the past year at a cost of £93,100. Ten of the staff of 48 are senior graduate investigators.

Floor area totals 12,000 sq. ft. and a further floor can be added to the administration building if necessary. Much of the work programme will be associated with problems connected with dust, particularly the prevention of dust sticking to castings, and the elimination of dust in the foundry air.

Equipment in the dust laboratory includes a dust tunnel and a range of sampling apparatus, including the Hexhlet sampler.

One of the methods of dust analysis is by X-ray crystallography. Other work will cover noise abatement.

#### No Restrictions for SD Fellowship

A graduate fellowship in chemical engineering has been established at Massachusetts Institute of Technology, the first industrial fellowship in chemical engineering at MIT to be specifically without any restrictions as to nationality of the recipient, by Scientific Design Co. Inc., New York. Selection for the SD fellowship will be made shortly by MIT.

## £3m. FOR SCIENCE EDUCATION

THERE is no school of importance now, whether for boys or girls, that is not thinking of science, said Sir Hugh Beaver, president of the Institution of Chemical Engineers, at the annual dinner of the Society of Chemical Industry's chemical engineering group on 4 June. This was the result of work carried out by the committee of the Industrial Fund.

Sir Hugh Beaver, who was the principal guest at the dinner, said the committee of the fund considered the need for assistance in order to extend the teaching of science in schools that did not get sufficient support for capital expenditure. By means of a questionnaire the committee had collected details of 460 schools, which included 301 independent schools and 128 having direct grants. Of those, 261 were boys' schools, 168 girls' schools, and 31 co-educational.

The committee had given grants to 330 schools, of which 187 were for new buildings or the conversion of buildings. The amount they had distributed or to which they had committed themselves was just under £3 million. Some £3,171,000 had been subscribed, but there was a large item of interest to cover present expenditure against future revenue.

Grants amounting to nearly £400,000 to overcome the serious lack of apparatus had been given to the schools, including those which had received building grants.

The work had created an entirely different attitude of mind on the part of a large number of masters, declared Sir Hugh. They all realised that this was a

very generous effort on the part of industry, and they felt they had been given a great opportunity.

Sir Hugh continued: 'The committee of the fund has done a very small part of what this country has to do. There is nothing of generosity or charity in it. The country is vitally concerned with the development of science in every direction and the production of scientists, not only for manufacturing industries, but for administration and the running of the country. This country and our industry will go under if we cannot keep our place in the scientific effort.'

'It was the original intention,' continued Sir Hugh, 'that the work was to be limited to boys' schools, but it was decided to include girls' schools. We must find places for women scientists in industry. The potentiality of male scientists in our population is not great enough to allow us to ignore more than half the population, and there is no question that over the next few years in the business and industrial world we shall be able to see that there is a great force to be used in the girls' schools.'

Sir Hugh also referred to the problem of training sufficient science teachers. The number of teachers who would be necessary over the next 10 years for schools and universities and in the colleges of advanced technology was well over 10,500. One of the ways in which the problem would be solved was by greater recognition by industry of the benefit it would mean.

# CHEMICAL PIONEERS

## 8 Fredrick Accum

*Fredrick Accum, the subject of the eighth article in this series on the pioneers of the chemical industry, specially written for CHEMICAL AGE by Dr. D. W. F. Hardie, was a successful populariser of chemistry and a pioneer in the application of chemistry to industry.*

**F**REDRICK ACCUM was born on 29 March 1769 in Bückeburg on the Aue, the tiny provincial capital of Lippe-Schaumburg. He was the sixth child of Christian Accum and his wife Judith La Motte. The father, a Jew, had before baptism in 1755 been known as Herz Marcus; he carried on a small but successful business as a soap-maker. Christian Accum died when his son Fredrick was only three and his youngest child, a daughter, barely a year old. Despite his father's early death and the consequent poverty of his mother, young Fredrick was in due course entered at the gymnasium in Bückeburg, where he received an excellent education. His brother Philip, who was ten years his senior, having inherited the family soap-boiling business, Fredrick sought employment away from his native town. He became an apprentice with the Brande family, pharmacists by appointment to George III. Hanover was still part of the British realm, and the Brande firm had a branch in London, to which Accum was sent in 1793 to work as an assistant.

### Private Study

In London Accum mastered the English language and advanced his knowledge of chemistry by private study and attendance at public lectures. Less than five years after his arrival in the metropolis he was engaged by William Nicholson to write contributions to the latter's *Journal of Natural Philosophy, Chemistry and the Arts*, founded in 1797. Accum's first paper in the *Journal* was published in April 1798; it discussed the phenomenon of the light emitted in the dark by borax when it is rubbed or struck. Two months later his second paper appeared; it was concerned with methods of determining the purity of drugs and medicinal preparations. By 1800 Accum's circumstances were such that he was able to set up in business on his own account at premises in Old Compton Street.

For the next 20 years Accum enjoyed unique importance as a supplier of laboratory apparatus and analytical chemicals. The illustrated catalogue which he published in 1812 listed no fewer than 328 pieces of experimental apparatus and 340 chemicals. Crates of his carefully-packed chemicals and laboratory equipment were sometimes shipped across the Atlantic to several American colleges which included chemistry in their curricula.

Accum's activities were by no means confined to the preparing and retailing of laboratory wares. Two decades before Liebig's world-famous Institute opened its doors to students in Giessen, Accum was teaching practical chemistry by experimental participation. The fees for his courses in 'operative chemistry' and 'technical chemistry' ranged from 27 to 39 guineas, and his pupils were frequently men of social and academic distinction. In 1801 Accum was appointed 'chemical operator' at the Royal Institution, where he collaborated with Davy; in 1809 he became Professor of Chemistry at the Surrey Institute. Chemistry at that time was attracting the interest and curiosity of the cultured and leisured classes. Accum's lectures at the Surrey Institute became social occasions and the lecturer himself something of a figure in society.

### Industrial Aspects

Business preoccupations and his teaching activities left him sufficient energy to play an important part in the application of chemistry to industry. In 1802 he gave technical assistance in the working of a soda factory, and following his work in this connection he published in Nicholson's *Journal* a paper on 'The Methods by which Soda is at present Prepared for the English Market.' Two years later he was carrying out research for the Staffordshire potteries on new raw materials for the manufacture of earthenware.

F. A. Winsor, a Moravian, who in 1804 had given the first demonstrations of gas-lighting in London, called on the services of Accum as an expert witness when he contested before a Committee of the House of Commons Murdock's application for an exclusive charter. On this occasion Accum produced as exhibits samples of ammonium salts, sulphur and oil, which he had prepared by distillation of coal tar; he also described his not entirely successful attempts to measure the illuminating power of gas by comparison with a candle flame. When Winsor, in 1812, established his Chartered Gas-Light and Coke Company, Accum was engaged as the concern's 'practical chymist.' Opposition to the new form of lighting came from many quarters. It was argued that it would reduce demand for whale oil, then extensively used as an illuminant, thus diminish the importance of the whaling industry, that tough nursery of seamen, and hence seriously reduce recruitment of able-bodied mariners to the Navy! The great Davy pronounced the use of gas to be dangerous, and W. H. Wollaston said 'they might as well try to light London with a slice from the moon!' A committee of the Royal Society recommended

the Government to limit by legislation the capacity of gasholders to 6,000 cu. ft. Accum, who with Samuel Clegg was responsible for the engineering operations of Winsor's company, ignored the alarmists and erected, in 1815, a gasholder of 10,000 cu. ft. capacity.

The sugar industry had long attracted Accum's interest. In 1799 he had introduced the first small quantities of beet sugar into this country from Germany. In 1812, with Davy and Dalton, he gave expert evidence for a sugar refining company whose works had been destroyed by fire as a result of circulating heated whale oil to their evaporation pans—one of the earliest examples of the use of oil to transport heat into process vessels. The insurance company contested the claim on the ground that, when the policy was taken out, they were not informed of the use of whale oil for this purpose. The refiners won their case.

During the whole of his sojourn in London, Accum's pen was busy. In addition to his papers in Nicholson's *Journal* he contributed articles on such matters as the analysis of natural mineral waters to Tilloch's *Philosophical Magazine*. In an article in the last-named periodical he described, in 1808, a process for producing fire by gaseous pressure which was in effect the principle of the Diesel engine. In Thomson's *Annals of Philosophy* he wrote on 'Illuminating Streets by Coal-Gas.' His two-volume textbook, 'System of Theoretical and Practical Chemistry,' published in 1803, dealt extensively with the application of chemistry to the soap and brewing industries and with such operations as the silvering of mirrors. 'Elements of Crystallography' appeared in 1813, and in 1817 he published 'Chemical Amusements, a series of Curious and Instructive Experiments in Chemistry which are easily Performed and Unattended by Danger,' which attracted wide popular attention and was translated into a number of languages. He produced, too, textbooks on the chemistry of cooking and on the art of making wine from fruits.

### Sophistication

During the first half of last century and even after the passing of the 1860 Act for Preventing the Adulteration of Articles of Food and Drink, sophistication of foodstuffs and medical materials was a source of great profit to the many enterprises engaged upon it. Analytical methods for its detection were crude or lacking and legislation had not been formulated to deal with it. In 1820 Frederick Accum published his 'Treatise on Adulteration of Food,' which bore on its title-page the text from 2nd Kings—'There is death in the pott.' How great were the vested interests in adulteration may be judged from the outcry that greeted this book. The most respectable papers reviewed it adversely and even savagely. The popular lecture idol had stirred up a nest of vindictive hornets about his ears!

There can be little doubt that the events which quickly followed were not unrelated to the antagonism Accum had aroused towards himself. Probably for many years he had spared himself the toil

of compiling notes by the eccentric expedient of tearing pages from the volumes of Nicholson's and other journals in the library of the Royal Institution. Now he found himself arraigned on a charge of stealing paper to the value of a few pence. Perhaps, realising the frivolous nature of the charge as preferred, the authorities changed it to one of having mutilated the books in question. This Dreyfus affair in miniature of 1820 became the topic of London. That the charge was trivial, even in its later form, could hardly be denied. A paper called *John Bull* published the verse comment:

What is his crime? A trick at most,

A thing not worth debating,

'Tis only what the *Morning Post*  
Would call ACCUM-ulating.

But for Accum the matter was neither trivial nor amusing. Released on bail, he

fled to Germany, never again to return to the city where he had been so successful as a populariser of chemistry and as a pioneer in the application of chemical science to industry.

In Germany he collaborated for a time with Gottlob Nathusius who was carrying on a kind of industrial research establishment at Alt Haldensleben. During the last 15 years of his life he carried out the combined duties of professor of technical chemistry and mineralogy at the Gewerbe Institut and those of professor of physics, chemistry and mineralogy at the Bau-Akademie in Berlin. In 1824 his 'Dictionary of Chemical Apparatus' was issued in London under the name 'Mucca' to ease the fears of his publisher. Two years later he produced his last work; written in German, it was a textbook dealing with the physics and chemistry of building materials. He died in Berlin on 28 June 1838.

## New Gas Liquefier 'Produces Liquid Air in Minutes'

A NEW gas liquefier, known as the 'Norelco' gas liquefier, of simple design and small proportions, which is said to produce liquid air at the touch of a button in a matter of minutes, has recently been developed by the instrument division of the North American Philips Company Inc., US.

In operation, helium is compressed in a chamber surrounded by a water jacket. The gas at constant volume passes through a regenerator where it gives up more heat. It then passes to an expansion chamber where volume increases thus lowering temperature. Without decreasing volume, the helium is now moved back through the regenerator to the compression chamber where the cycle begins again. In returning to the compression chamber, the gas absorbs heat that was previously stored in the regenerator.

This new gas liquefier is 37 in. long, 20 in. wide and 34 in. high, excluding swinging spout and concrete mounting base. It produces approximately five quarts of liquid air per hour and weighs 660 lb. Air or gases to be liquefied instead of passing through the internal mechanism of the machine enter a chamber surrounding the cylinder at normal atmospheric pressure, condensing on the cold surface of the head until the quantity is large enough to be run off. The system provides an oil-free, high-purity product. If desired, selected gases or vapours can be passed over the head and liquefied.

The liquefier consists of a single cylinder containing two pistons. At one point of the cycle, pistons come close together, compressing the gas between them. As the helium is compressed, the displacer moves downward to enlarge the chamber above it. At the proper moment, the compressed helium is forced out of the compression chamber through the regenerator and into the expansion chamber where cooling takes place.

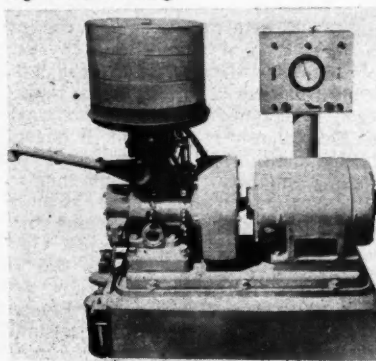
Next, due to the phasing of the piston

and displacer, volume of the compression chamber is increased and the expansion chamber volume decreased. Thus, the helium is moved back to the compression chamber without being compressed. Action on the gas during complete cycle can be described as compress-transfer, expand-transfer.

Powered by a 10 h.p. motor, the machine stops automatically if helium pressure exceeds 375 lb. per sq. in. or drops below 220 lb. per sq. in. During operation, helium is needed from the outside supply only when required to compensate for leakage.

Before the start of operations, helium is supplied to the system until the static internal pressure reaches approximately 225 lb. per sq. in. When the motor is in operation, the internal pressure reaches an average value of 310 lb. per sq. in. The machine stops automatically if water pressure drops excessively.

Mounted on a control panel are: pressure gauge, flowmeter, condenser pressure gauge, low pressure safety lock-out, three-way valve for flowmeter, shut-off, pilot lights for water pressure, manometer pressure and oil pressure. Under ordinary conditions of humidity or in air conditioned rooms, the machine can usually operate 23 hours out of 24, allowing for defrosting.



## Glass Technologists' Annual Dinner

PROFESSOR R. W. DOUGLAS, of the Sheffield University department of glass technology, the first of its kind in the world and the only glass training department at university level in Britain, is to give one of a series of lectures by British professors at the University of Munich. This was stated by Dr. J. M. Whittaker, vice-chancellor of Sheffield University when he replied to the toast of the guests at the annual dinner of the Society of Glass Technology held in London on 28 May. The toast was proposed by Dr. B. P. Dudding.

Sir John Wedgewood, proposing the toast of the society, referred to the unprecedented progress of the glass industry in the 40 years during which the society had existed. Mr. C. E. Ramsden, president, who replied, stated that the international commission on glass would meet in Britain during July with Dr. Dudding as its president.

## Control Instruments for Research Reactor

CONTROL PANEL and all physical instruments for the High-Flux Australian Research Reactor (HIFAR) at Lucas Heights, near Sydney, NSW, were supplied to Head Wrightson Process Ltd., main contractors, by George Kent Ltd., Luton. Records for the nuclear instrumentation were ordered from Kent's by Ekco Electronics Ltd., Southend-on-Sea.

In Australia, Kent engineers will assist in the erection, installation and commissioning of the instrumentation on site. Instruments supplied by Kent for this reactor covered:

Integrated flux power; fission products; spare experimental; gamma radiation (2); control-arm position; H<sub>2</sub>O coolant temperature; centre fuel-element temperature; multi-range linear power; log power; D<sub>2</sub>O outlet temperature; temperature D<sub>2</sub>O difference; gamma D<sub>2</sub>O; D<sub>2</sub>O/H<sub>2</sub>O and D<sub>2</sub>O purity; xenon computer; fuel-element temperature (2); shield temperature; pD (i.e. pH of heavy water); cooling-water pH.

Instruments from the Kent Commander range consisted of: H<sub>2</sub>O coolant flow; D<sub>2</sub>O flow; reactor D<sub>2</sub>O level; storage D<sub>2</sub>O level; reactor helium pressure; D<sub>2</sub>O/H<sub>2</sub>O pressure difference and two spares.

Kent's have received a similar contract for almost identical work on two experimental reactors for Harwell and Dounreay.

## Exemption of Spent Catalyst Import Duty

An application is being considered by the Board of Trade for the exemption from import duty of spent catalysts consisting substantially of platinum dispersed on aluminium oxide together with waste matter and those free from fluorine.

Representations which interested parties may wish to make in regard to this application should be addressed in writing to the Board of Trade, Traffic Division, Horse Guards Avenue, Whitehall, London SW1 not later than 24 June 1957.

**In Parliament****MORE BENEFITS FROM NITROGEN THAN OTHER FERTILISERS**

**T**AKING the three main fertilisers—nitrogen, potash and phosphate—the proportion of potash fertilisers used was nearer the optimum than in the case of either of the others. It was also increasing without a subsidy faster than either of the other two were at present increasing with a subsidy.

That was one of the reasons given by Mr. D. Heathcoat Amory, Minister of Agriculture, in the House of Commons on 6 June, for not giving a subsidy for the potash. He was speaking in a debate on the motion that the Draft Fertilisers (UK) Scheme 1957 be approved. Earlier in the day, in reply to a question, Mr. Amory had stated that payments under the 1956 fertiliser schemes were still being made and that total expenditure was likely to be about £22 million. The draft scheme for 1957 was likely to cost about £28 million. Asked if the increased cost was due to the higher price of sulphuric acid Mr. Amory said that the difference between the two figures was partly due to the rise in the subsidy given at the last annual price review and partly to the higher rate of consumption.

When the motion for approving the draft 1957 scheme came before the House, Mr. A. J. Champion (Derbyshire SE) wondered why the rate of subsidy for sulphate of ammonia had been increased by 30 per cent in one year and why nitrate of chalk had gone up 35 per cent over the same period. He asked 'Is the Minister satisfied that the prices being charged, which to some extent of course he is subsidising, are not pushed unduly as a result of the operations of great trusts.'

Major H. Legge-Bourke (Isle of Ely) was disappointed that no provision had been made for a potash subsidy. This was particularly regrettable in view of the need to promote British horticulture. He believed that the monopoly in potash was now considerably less than in previous years, owing to large sources of supply from Israel and elsewhere.

Replying, Mr. Amory said that no subsidy was given for potash because it was an imported product, with a large proportion of it coming from one cartel. The amount available from Israel was a very insignificant proportion of the total. It would be difficult to give a subsidy here, because there was little assurance that the effect would not be an increase in the price of imported potash. Mr. Amory was quite satisfied that horticulturists received considerable benefits from existing subsidies on other fertilisers.

Mr. Champion, said Mr. Amory, raised the important question of the sharp increase in the subsidy on nitrogen. Broadly speaking, the reason was that we should get more benefit from a still more rapid increase in the rate at which nitrogen fertiliser was used than in the case of either potash or phosphate fertilisers. It was very important for the further improvement of grassland.

The Government would have been willing to see further increases if the productive capacity had made it possible. But the increases in productive capacity in this country were now going ahead and it was thought that this year it was safe to stimulate and provide an incentive for a further improvement in which, the year before, it had not been thought wise to do.

Mr. Champion had also asked if the Minister was satisfied that the fertiliser manufacturers would not recover the value of the subsidy in increased prices. Mr. Amory said: 'We have no price control at present over the prices charged for fertilisers in this country, but we keep a close eye on them. . . . In general the prices charged for fertilisers in this country compare very favourably with the prices current in the countries of west Europe.' The Government had referred the fertiliser manufacturing industry to the Monopolies Commission, which was now considering the matter, but which had not yet made its report.

**Evidence of Dumping or Subsidy Policy**

Asked if the President of the Board of Trade would make available to organisations representing manufacturers any evidence obtained by overseas trade attaches or other official channels relating to dumping or subsidy policies adopted by overseas Governments, Mr. Derek Walker-Smith, Parliamentary Secretary to the BoT, said that overseas officers would not necessarily have such information. When it was available, the Board of Trade would normally be prepared to give it to interested parties and were already doing so.

**Closed Flash-point of Petroleum**

A NEW British Standard, BS 2839: 1957, 'Determination of closed flash-point of petroleum products by means of the Pensky-Martens apparatus,' is technically identical with the Institute of Petroleum publication, IP/34/57. It describes a method for the determination of the closed flash-point of petroleum products having a flash-point above 120°F.

The Pensky-Martens apparatus used is described in detail under six main heads: oil cup, stirring device, lid, equipment attached to the lid, stove, and thermometer.

The methods of preparing the sample and of carrying out the determination are specified in detail. The standard also gives some information on the degree of precision which can be obtained, and a note on the correct interpretation of the terms 'repeatability' and 'reproducibility.'

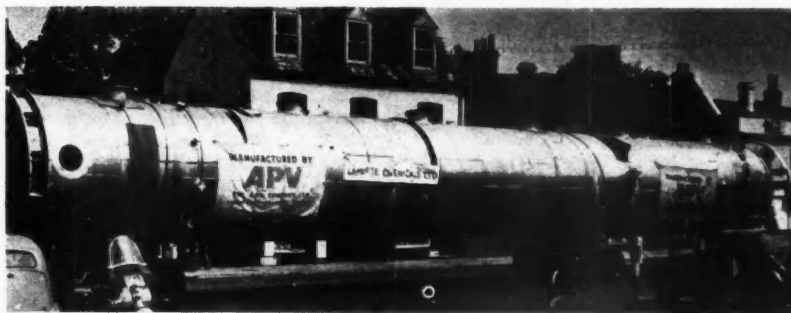
Copies of this standard may be obtained from the British Standards Institution, sales branch, 2 Park Street, London W1, price 3s.

**BS for Analysis of Coal and Coke**

AS NOW published British Standard BS 1016, deals only with the analysis and testing of coal and coke. The preparation of samples for analysis will be dealt with in a forthcoming revised BS 1017.

The new standard is being published in separate parts: Part 2—total moisture of coke—which deals with the determination of moisture in the coke 'as sampled' by the indirect method; part 3—proximate analysis of coal—wherein the method for determination of moisture, volatile matter and ash in the analysis sample is given; and part 4—proximate analysis of coke—which details the determination of moisture, volatile matter and ash in the analysis sample.

Copies of these publications are obtainable from British Standards Institution, 2 Park Street, London W1, part 2, 2s 6d, part 3, 5s, part 4, 3s 6d.

**Laporte's 80 ft. Extraction Column**

This aluminium extraction column, 80 ft. long by 9 ft. diameter, is one of six being made by the APV Co. Ltd., Manor Royal, Crawley, Sussex, for Laporte Chemicals Ltd. for the production of hydrogen peroxide. Its fabrication involves the welding of aluminium up to 1½ in. thick. Shown passing through Dunstable, Beds, the column is claimed to be one of the longest objects to travel by road, the overall length of the vehicle and column being 104 ft. It left APV's Crawley works on 30 May and reached Warrington on 3 June.

## Fluorine Based Products well Received, say Consolidated Zinc

**G**ROUP trading balance of the Consolidated Zinc Corporation Ltd. was £187,532 lower at £6,250,323 in 1956 as already announced. The dividend of 22½ per cent is repeated. The decrease in profit was wholly due, chairman, Mr. L. B. Robinson said, to the effect on the group activities in the UK. Profits from Australian subsidiaries showed little change.

Sulphuric acid deliveries in the UK totalled a little over 253,000 tons, or 11 per cent of total UK consumption, and were at the same level as in 1955 despite some reduced activity in the steel pickling trade during part of the year. Demand from the superphosphate trade and for sulphate of ammonia production was maintained.

In Australia, production of sulphuric acid by the Sulphide Corporation of Cockle Creek was 19 per cent below the 1955 level due to the curtailment of superphosphate production following the prolonged period of wet weather in the main consuming areas. Improved conditions are now reported and additional capacity is to be provided in conjunction

with the zinc smelting project at this site to meet the forecast of continued expansion of fertiliser demand in New South Wales.

Increased output of high purity hydrofluoric acid is reported with additional quantities being supplied to the Atomic Energy Authority and some oil companies for use as a catalyst. Fluorine-based products made satisfactory progress and new plant for production of Isceon, fluorine-based refrigerants and aerosol propellents went into operation in January this year. Deliveries from the pilot plant have been well received, it is stated.

Satisfactory development of barium chemicals, started in 1953, is reported, with range of products and capacity being increased during the year.

Plant at the wholly-owned subsidiary, Titanium and Zirconium Industries Ltd., for obtaining, rutile, zircon and ilmenite from sands on Stradbroke Island, Queensland, went into full operation during the latter half of the year. Lack of shipping space hampered the delivery of the increased production under contract to

the US. A substantial part of planned output has been sold ahead for several years at satisfactory prices and additional plant is to be provided to meet further commitments due to further forward sales.

Through the company's investments in British Titan Products Co. Ltd. (approximately 31 per cent) Consolidated Zinc continue to share in the rapid expansion of the titanium dioxide industry. The additional capacity now being constructed in the company's plants in the UK and Australia will soon come into production, the chairman announced.

The research and development departments are stated to have had an active and rewarding year in work on the development of new processes and products. The newer metals of interest in the commercial development of nuclear power are being followed, and on behalf of the Atomic Energy Authority the company has been operating a pilot plant for the production of beryllium.

## SAI New Range of Concentrated Fertilisers will be Marketed in July

**A**NEW range of concentrated complete fertilisers, based on ammonium phosphate, will be marketed next month by Scottish Agricultural Industries Ltd., 39 Palmerston Place, Edinburgh 12.

Known as SAI CCF No. 1, No. 2 and No. 3, the fertilisers contain 40 units and upwards of plant food per ton. This is claimed to be a substantial increase over the majority of compounds now available.

One ton of SAI CCF is said to contain the same amount of plant food as 1½ tons of the normal grade compounds.

According to the company, these concentrated fertilisers will cost less per unit of plant food and farmers will save storage space as well as labour and time in handling and applying them.

Analyses of the range are: CCF No. 1—nitrogen, 12.0; soluble phosphate, 11.8; insoluble phosphate, 0.2; potash, 18.0; plant food units, 42.0; CCF No. 2—nitrogen, 13.5; soluble phosphate, 13.2; insoluble phosphate, 0.3; potash, 13.5; plant food units, 40.5; CCF No. 3—nitrogen, 10.0; soluble phosphate, 20.0; insoluble phosphate, 6.0; potash, 10.0; plant food units, 46.0.

SAI's new £3 million plant at Leith, where the CCF range will be made, is being started up in July and will be in production in the autumn. A spokesman of the company told *CHEMICAL AGE* that SAI will be accepting orders for the new fertilisers next month.

The new plant has been built on 12 acres of land reclaimed from the Firth of Forth. When work began on the site in October 1954, nearly 2,000 piles had

*Reinforced concrete trestles carry the raw material intake conveyor gantry at the Leith fertiliser works where the new SAI CCF products will be made. The intake conveyor is capable of moving 350 tons of raw materials an hour from the docks to the main storage building*

to be driven to support the heavy loads from plant and buildings. Raw materials are unloaded from ships on to a belt conveyor system capable of moving 350 tons an hour. Carried across the works on concrete trestles, the conveyor runs along the top of the 900 ft. long main storage building and the raw materials are discharged through ports in the roof. This storage building can hold 56,000 tons.

On the site of the company's old fertiliser works in Salamander Street, Leith, a 40,000 ton bulk storage building for the finished product is under construction. A high-speed bagging plant is to be built on the same site.

### Industrial Water Supplies

LOCAL water undertakings should be consulted by industrial concerns when they are considering starting a new factory or process, the Water Companies' Association stress.

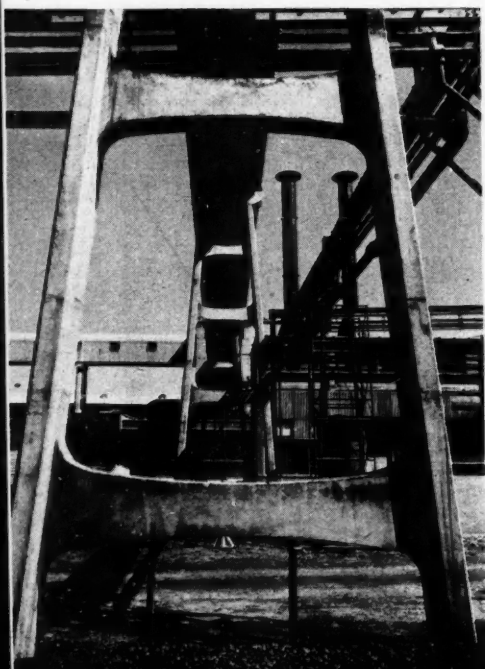
It is emphasised by representatives of the association that for most areas of the country there is no problem of industrial water supply which cannot be solved if there is co-operation from industry regarding its needs at an early stage.

In some areas there is a scarcity of water, and in such cases costs of water supplied are greater.

Some one-fifth of the water used in Britain is supplied by members of the Water Companies' Association.

### Conference on Chemical Additives in Food

A conference has been arranged by the Food Law Institute of the US, the food group of the Society of Chemical Industry, the Society for Analytical Chemistry and the Association of Public Analysts on 'The control of chemical additives in food.' It will be held on Friday 26 July in the Royal Institution, Albemarle Street, London W1.



## Overseas News

### NORWAY ORDERS HEAVY WATER AND ATOMIC FUEL

**H**EAVERY water is to be bought by Norway's Atomic Energy Institute from the US. Some 16 tons have been ordered at a price, inclusive of transport, of 7.1 million crowns (£355,000 approximately). The heavy water is required for the experimental reactor which is under construction at Halden.

It was planned originally that heavy water for the reactor would be obtained from Holland and from Norsk Hydro—eight tons from the former and seven tons from the latter. Hydro's output of heavy water has been reduced by lack of rainfall over the past two years, so that the agreed amount of heavy water could not be delivered before this autumn when the reactor is scheduled to begin operating.

Norway's arrangements with Holland were that the Institute would take over the Dutch Atomic Energy Centre contract concluded with Hydro, but this contract has now been cancelled.

The cost of buying heavy water from the US is said to be less than if it had been supplied as first planned. Payment will be made in instalments. Norway's Atomic Energy Institute has also concluded a contract for the purchase of about eight tons of natural uranium in the form of fuel elements enclosed in aluminium alloy containers with the UK Atomic Energy Authority.

### Sulphur Extraction Plant to be Built in Alberta

Plans are to be proceeded with for the building of a sulphur extraction plant in the Okotoks field in Alberta, Canada, according to a joint announcement by Paul L. Kartzke, vice-president of Shell Oil Co. and Morris Palmer, president of Devon Palmer Oils. Shell and Devon Palmer will be responsible for this enterprise which will result in a plant capable of producing 300 tons of sulphur a day with approximately 15 million cu. ft. a day of residue gas for sale in the Calgary area. Under terms of the agreement, Devon Palmer will operate the plant.

### US Fertiliser Industry Recovery

Now making a recovery following the ending of the drought in the Middle West is the US fertiliser. Leading producers of nitrogen and ammonia with large interests in the production of basic raw materials for fertilisers now report that demand for these is improving, and there are indications of higher sales and profits for the second half of this year. Prices are to be increased also from 1 July. Allied Chemical and Dye Corporation and Spencer Chemical Co., leading US producers of ammonia and fertiliser chemicals have announced price increases of an average of \$8 a ton, and it is understood that other companies will follow this lead.

Demand for the products was exceptionally marked in April and May and some companies are now finding they are running short of materials. As surplus stocks developed during 1956, plant capacity was reduced. Stocks have now been substantially reduced and increased production is planned. Monsanto Chemicals in the US, in particular, whose company report a decline in turnover in 1956 to reduced fertiliser chemical production is now expanding operations.

Water levels, following the ending of the drought, have been raised to such an extent that there will now be ample water supplies for 1958, and possibly several more seasons. The heavier demand for fertiliser is therefore expected to continue in 1958 and for several future seasons.

### India's Demand for Dyes

Three estimates of annual demand for dyestuffs in India by 1960-65 have now been made. The Government's original estimate placed 1960 demand at 7,000 tons, or roughly Rs 20 crores, an increase of 30 per cent on 1956 consumption. Imperial Chemical Industries have given a figure of 10,000 tons a year by 1965, basing their estimate on the rising demand for cloth.

Figures have now been worked out by a voluntary team of Indian technologists, who estimate that by 1960-61 demand will total more than 15,000 tons. They visualise that the biggest increases will come in vat powders and pastes, from 14½ million lb. to 19 million lb.; azo dyes, up 65,000 lb. to 3¼ million; basic dyes up 250,000 lb. to 1 million; naphthols and fast colour bases, both up 700,000 lb. to 2 million; and sulphur black, up 700,000 lb. to 3¼ million.

### Norwegian Soviet Trade in Chemicals

Under a second protocol to the trade agreement covering trade between Norway and the Soviet Union during 1956-1958, the following additional goods will be supplied by the USSR: raw phosphates, 20,000 tons; chromium ore, 10,000 tons; paraffin wax, 400 tons; asbestos 1,000 tons, naphthalene, quota still subject to agreement; general chemicals, 2,000 tons. Norway is to supply the Soviet Union with chemicals to the value of N.kr. 1 million.

### Scanner for Two-Dimensional Chromatograms

Forro Scientific Co., 833 Lincoln Street, Illinois, US, are marketing a scanner for two-dimensional paper chromatograms tagged with low energy beta-emitting isotopes.

It employs a small flow counter with low background and is claimed to be the

only scanner which can scan paper chromatograms tagged with tritium. Exchangeable, stainless steel apertures insure easy decontamination.

In combination with a scaler it can count any-odd-shaped, low activity sample up to one inch diameter. The sample may be in the form of a biological section, a skin area, a slurr on a sample pan or an air sample collected on a filter.

When the opening of the flow counter is closed with the thin windows supplied, it can be used as a laboratory monitor to detect contaminations due to low energy beta-emitting isotopes.

### Surface Coating for Titanium and Alloys

Working for the US Army Ordnance Corps, three chemists at the Battelle Memorial Institute have developed two chemical baths for coating the surface of titanium and its alloys to give increased wear resistance. In the first, either heat-treated trisodium phosphate-fluoride or sodium\* tetraborate-fluoride is used as a surface coating to provide continuous resistance for long periods.

The second method involves the addition of MoS<sub>2</sub>-Epon resin to the heat treated phosphate-fluoride or borate-fluoride to coat the surface and provide resistance against high speed rotary wear under relatively high loads.

Both methods are described in a 43-page publication obtainable from the Office of Technical Services, US Department of Commerce, Washington 25, DC, US, order PB 111805, price \$1.25.

### Lithium Prospects Described by du Pont Geologist

More optimism in the future of lithium products than at present seemed justified had been stimulated by the supposed need for an isotope of lithium in the fusion reactor. These applications, however, were not, and could not soon be, an important factor in the demand. So stated the chief geologist of E.I. du Pont de Nemours and Co. at a recent meeting of the American Institute of Mining, Metallurgical and Petroleum Engineers. He revealed that the capacity of six northern US plants now amounted to about 12,000 short tons of lithium carbonate, while the demand in 1956 was estimated to have been 5,500 tons. Demand in 1960 is estimated at probably less than 8,000 tons.

### SRI Develops Computer for X-ray Analysis

Time required for the X-ray analysis of crystalline structures can, it is stated, be reduced from months to hours with a new computer developed at Stanford Research Institute, California, for use in the institute's laboratories. The computer is only a fraction as complex, bulky, or costly as others employed for similar purposes.

Spot positions and intensities obtained by X-ray spectrography do not directly lead to the true arrangement of the atoms in the crystal. This has hitherto been obtainable only by calculation, requiring a large amount of time, or by large electronic digital computers.

Through use of the new computer, however, it is claimed that an exact pattern can be obtained much more rapidly and at much less expense. Co-ordinate numbers representing the spot locations and the intensity of each spot, obtained from the original X-ray spectrograph, are fed into the computer. These two numbers govern the relative rotation of two transparent film discs marked with parallel lines. By means of a controllable lamp, an exposure is made through two discs on to an unexposed photographic film for a time proportional to the measured intensity of the given spot.

Adjustment of the two discs and the exposure time thus provides for combining the three variables—two spot position measurements and one intensity measurement. When an exposure is thus made for each and every spot on the spectrograph film, the resulting picture reveals the correct structural pattern of the specimen crystal.

### Union Carbide to Build Technical Service Laboratory

Plans to build a technical service laboratory on their Westchester County property near Tarrytown, NY, have been approved by Union Carbide Chemicals Co., a division of Union Carbide Corporation. The laboratory is expected to be completed early in 1959.

It will include facilities and personnel to serve a total of 24 major industries, including paper, plastics, petroleum, rubber, agricultural chemicals, refrigerant, aerosol, and surface coatings. Complete analytical facilities with provisions for tracer chemistry will be included. Housed in a three-storey building, 360 ft. by 60 ft., the laboratory will have 63 individual laboratory units, and a 200-seat auditorium which will be used for technical meetings.

### Norway to Invest More in Training and Research

The Norwegian Government's new four-year programme for 1958-61 includes plans for a 25 per cent increase in research personnel and a greater investment in training and research generally.

### Anhydrous Ammonia Price Increases in US

An increase of at least \$8 per ton in the price of anhydrous ammonia as from 1 July has been announced by Allied Chemical and Dye Corporation, US. This price increase is expected to be followed by other US producers of this key fertilizer ingredient. The price will be \$80 a ton for delivery after 1 July, and \$88 from January, 1958.

### US Monsanto Plan New Niran Plant

Building work recently started by Monsanto Chemical Co. of the US at Anniston, Alabama, for a new Niran (ethyl parathion) and methyl parathion plant is expected to be completed in the autumn of this year. Each process in the production of methyl parathion will be iso-

lated to lessen explosion hazards. Methyl parathion is not to be made at the company's Nitro, West Virginia, plant, where two months ago the production unit was destroyed and eight employees killed. The production of Niran has again started at this plant.

### New CIL Plant

Canadian Industries Ltd. are shortly to undertake construction of a new contact sulphuric acid and oleum plant with a daily capacity of 150 tons at Beloeil, Quebec. Both products will be used at the Beloeil works for the manufacture of agricultural chemicals and explosives.

### US Radiological Handbook

A radiological handbook for use in training courses at the US Public Health Service's Robert A. Taft sanitary engineering centre in Cincinnati is available through the Office of Technical Services, US Department of Commerce.

A glossary of radiological terms is included together with sections on physical, chemical and mathematical data, radio-isotopes, decay, radio-assay and radiation protection. A table of isotopes is also included.

Copies may be obtained from Office of Technical Services, US Department of Commerce, Washington 25, DC, price \$3.75.

### Coating Magnesium with Corrosion-Resistant Aluminium

Vapour plating appears to be a feasible method of coating magnesium with corrosion-resistant aluminium, according to a report of USAF-sponsored research just released for industry use through the Office of Technical Services, US Department of Commerce, Washington 25 (BP 121860 by C. F. Powell and I. E. Campbell, Battelle Memorial Institute, November 1956, price 75 cents).

### Canadian Company Produces New Blasting Agents

A new blasting agent which can be mixed on the spot and is said to cost less and be safer to transport and handle has been introduced to the Canadian market

by Canadian Industries Ltd. It is reported that trial blasts have indicated that the new explosive is suitable for open pit mines and quarries. It is claimed, too, that this explosive will open an important segment of the Canadian explosives' markets to manufacturers of chemical fertilisers who now make ammonium nitrate for fertiliser use.

### Iran's Prohibited Imports

Among imports prohibited by the Iranian Government until 20 March 1958 are the following: mineral and sea salt; sulphur; mineral turpentine; caustic soda; nitric or azotic acid; sulphuric acid and hydrochloric acid; impure sodium carbonate; sodium hyposulphite; ethyl alcohol.

### Polystyrene Plant for NSW

A new polystyrene plant is to be built by CSR Chemicals Ltd., of Australia, by 1958 under a new agreement with the Dow Chemical Co. of the US. Located at Rhodes, NSW, the new plant will cost about £500,000. Under the agreement, CSR Chemicals will receive full and exclusive technical information on future improvements to polystyrene products.

### Imports of Natron Salt

Algeria has opened a quota for £7,500 for the import of natron salt from the UK. Period of validity extends until 30 September.

### Argentine Import Laws

Goods which may be imported into Argentina at the free rate of exchange without permit or surcharge now include: synthetic rubber and latex and other assimilated products; cyclopropane gas and other anaesthetics, in bulk only; and smoke black, excluding lamp black and activated carbon.

### New Resin Plants

The Gelvatol plant of Shawinigan Resins Corporation at Springfield, Mass., is now in operation and a new plant at Trenton, Michigan, is expected to start production later this month.

## Basic Research in the US

MOST RECENT of the US National Science Foundation surveys indicates that sums spent on research by colleges and universities, although not large, are important since it is these establishments that undertake basic research. In the year of the survey, 1954, some \$257 million was spent by colleges for research. Outside sources sponsored research to the value of \$206 million.

Seventy per cent of the funds for research come from Government sources; and in the physical sciences, they provided 85 per cent of the money.

Of \$14.7 million for research in chemistry \$10.4 million was from the US Government with the defence department

the largest contributor (\$6.8 million) followed by the Atomic Energy Commission and Department of Health, Education and Welfare. Industry, it appears, provided about 60 per cent of the \$64 million for research at US colleges and universities of which \$4.3 million was spent on chemical research. Of the \$1.9 million which foundations spent on research in physical sciences, more than half went for chemical research.

Some \$51 million was spent for departmental research (not sponsored by outside sources) which is regarded as a part of teaching and university operation. Detailed costs were not obtainable but NSF estimated that 35 per cent covered research in the physical sciences.

# Knapsack-Griesheim Report Reflects Increased Sales

## Heavy Expenditure on Plant and Research

**I**NCREASED sales and heavy expenditure on new plant and research are revealed in the latest German company reports.

Knapsack-Griesheim AG increased group sales by 26.8 per cent to DM 367 million last year, largely as a result of extensions at the Knapsack works near Cologne and in the oxygen department. Exports accounted for 14 per cent of turnover. Over DM 50 million were spent on new plant, and capital expenditure is expected to continue at a high rate.

The carbide furnace put into operation late in 1955 was brought to a capacity of over 40,000 kW last year and is thus believed to be the largest closed carbide furnace in the world. Another furnace of the same type is to be built to replace older furnaces. When this comes into operation, Knapsack-Griesheim AG will still be unable to meet all needs; purchases at higher prices from the Soviet occupation zone and foreign sources will therefore have to continue.

The largest rate of increase was achieved last year in the production of phosphorus compounds. A plant for making tetrasodium pyrophosphate and sodium tripolyphosphate was opened in March 1956, and the second phosphorus furnace was started up in October. With a capacity of 46-50,000 kW it is the largest in the world. The two available furnaces give the company an annual output capacity of 35,000 tons of yellow phosphorus. Sales of phosphorus products rose by 60 per cent last year. A further increase in demand is expected but should for some time be covered by existing plant.

### Plant Extensions

Experiments with a fully-continuous thermal process for making magnesium were continued with satisfactory results. Increased demand for acetaldehyde and for acetic acid and anhydride necessitates an early extension of the plant for these products. The acetylene black plant also had to be enlarged to meet growing demands, especially abroad. A plant for making chloroprene was completed last year and opened in the first quarter of this year. It is described as the first in Europe.

Cassella Farbwerke Mainkur AG, another former IG Farbenindustrie enterprise, reached an annual turnover of close on DM 70 million last year, compared with DM 68 million in the two preceding years. The sales stagnation reflected by these figures, however, gave way to a substantial improvement in the first four months of 1957 when sales were over 20 per cent above the 1956 average. Plant investment was at a rate of DM 6 million last year and is expected to continue at this level; in 1955 it amounted to DM 16.5 million. A sum equivalent to

five per cent of sales is being spent on research. While previously research was directed chiefly at developing new dye-stuffs, however, increasing attention is now being devoted to dyeing techniques and to finding new outlets for existing dyes, especially for synthetic fibres.

Sachtleben AG für Bergbau und Chemische Industrie, Cologne, increased its sales by 10 per cent last year. Production of lithopone was raised from 45,000 to 52,000 tons by extensions to the works at Homberg on the Lower Rhine; half this output is being exported. Production of carbon disulphide at Gelsenkirchen-Schalke was slightly reduced; a sulphuric acid contact plant is being built at a cost of DM 5 million and expected to start operations in the next few weeks. Comparatively insignificant increases were recorded in the output of pyrites and barytes; the barytes mine at Dreislar, Sauerland which was closed, has been

reopened to deal with the heavy demand.

Salzdetfurth AG, Hanover, increased its potash sales by 10 per cent to 591,870 tons (K<sub>2</sub>O) last year. The plant at Salzdetfurth was converted to the joint production and processing of sylvinit and carnallite in September last, and a new conveyor was installed at Hattorf. Here and in other works emphasis has been laid on more efficient and economical production methods. Sales of salt at home declined but this was offset by increased exports. Nevertheless rationalisation measures have become necessary to wipe out losses incurred in the salt business. Domestic potash sales in the first four months of 1957 were 17 per cent higher than in the corresponding period of 1956 but West German potash exports were 10 per cent lower because of the reluctance of foreign buyers confronted with high freight charges. Sales of salt suffered because the fishing season was poor. Salzdetfurth's complete and mixed fertiliser plant at Scholven has reached the projected capacity rate and quality.

Guano-Werke AG, Hamburg, and Superphosphat Nordenham AG are to be merged. Co-operation between the works at Nordenham and the factories of Guano-Werke AG is expected to allow more efficient use of existing superphosphate making capacity, while the merger is also intended to reduce purchasing and administrative expenses.

## NBS Develops New Steel of Ultra High-Strength

**A** NEW ultra-high-strength steel claimed to be capable of heat treatment up to a strength of 285,000 lb./in.<sup>2</sup> with a sufficient ductility for structural applications has been produced experimentally by the US National Bureau of Standards in their thermal metallurgy laboratories.

Preliminary considerations indicated that the strength level desired could not be obtained in structural steel containing less than about 0.40 per cent of carbon if the steel was to be given some form of tempering treatment after hardening. In addition, the steel would require considerable amounts of alloying elements in order to transform completely to martensite. Experimental steels were therefore based on AISI 4340 modified as desired. Boron was added to a split of each melt since previous studies had indicated that boron increased hardenability and had a beneficial effect on the impact properties of some steels at room temperature and below.

A composition that appeared to give excellent strength and ductility was a steel based on AISI 4340 modified by the addition of silicon and titanium. Tests confirmed an ultimate tensile strength for the steel of approximately 285,000 lb./in.<sup>2</sup> and an impact resistance of 16 ft./lb. at both +70° and -40° F. Even better ductility and toughness properties were obtained on a single heat that was vacuum remelted.

Boron apparently had no particularly beneficial effect on the properties of the steels, neither did it appear to have any detrimental effect. In steel structures ap-

preciably larger in cross-section than those tested, the beneficial effect of boron in improving hardenability may be advantageous. It is believed that the properties obtained on the laboratory steels can be duplicated or even improved in well-made commercial steels.

Chemical composition of the NBS ultra-high-strength steels is:

	per cent
Carbon	0.40
Manganese	0.75
Silicon	1.60
Nickel	1.80
Chromium	0.85
Molybdenum	0.30
Titanium	0.10
Boron	0.003

## Less Oil Equipment Ordered from UK

Oil equipment and materials valued at some £36,049,000 were ordered from British firms during the first three months of this year, according to figures compiled by the Oil Companies Materials Secretariat and published by the Council of British Manufacturers of Petroleum Equipment. This is slightly below the £38,490,000 obtained in the corresponding quarter of 1956.

Orders placed in January-March 1957 include chemicals, valued at £5,102,000, specialised drilling and production equipment (£5,329,000), tubulars, pipe-fittings and valves (£5,181,000).



### Activated Carbon Filters

'Aeropure-Norit Air Purification by Activated Carbon Filters', a new brochure available from Farnell Carbons Ltd., Conduit Road, Plumstead, London, SE18, describes this range of filters developed to prevent cross-tainting of food-stuffs in cold storage and for the elimination of offensive odours, waste, explosive or toxic gases in industry.

### Gas Permeation of Polymeric Films

Information sheet G104 issued by British Geon Ltd., Devonshire House, Piccadilly, London W1, deals with the gas and water vapour permeability of p.v.c. and rubbers. The variables that influence the permeation of gas and vapours through various membranes which are considered, are effect of temperature, plasticisers, fillers, other ingredients pressure, film thickness, and molecular structure of the polymers. Information sheet G102 lists the trade names, composition and suppliers of vinyl plasticisers.

### Story of Rubber

A booklet, 'The story of rubber', published by Educational Productions Ltd. in collaboration with the Dunlop Rubber Co. Ltd., is intended to give teachers and student teachers a background picture for geography lessons. It tells of the first cargo of 70,000 rubber tree seeds which Henry Wickham brought from the Amazon for Kew in a ship specially chartered for the purpose, the subsequent development of Malaya, the shipment back to Britain of raw sheet rubber and liquid latex, and their conversion into countless products. Copies of the booklet, which is well illustrated, can be obtained from booksellers, newsagents and book-stalls, price 2s.

### Techniques in Polymer Science

Lectures, Monographs and Reports, 1956, No. 5, comprising the seven papers delivered at a symposium on 'Techniques in polymer science' held by the Thames Valley Section, RIC, in November last has now been published. Copies have been distributed to Royal Institute of Chemistry members with the April issue of the RIC journal. Further copies may be obtained from the Institute, price 7s 6d.

The introduction is by Dr. C. H. Bamford. Then follow papers by Dr. P. F. Onyon on 'Light scattering and osmometry', Dr. S. R. Caplan on 'Chromato-

graphic fractionation of polymers', Dr. A. Elliott on 'Infra-red methods', Dr. R. B. Beevers on 'Mechanical properties of polymers in the glass transition region', Dr. P. F. Holt and Mr. C. W. Went on 'Surface films', Dr. J. C. Bevington on 'Tracer techniques', and Dr. A. D. Jenkins on 'Kinetic techniques'.

### Purification of Oils and Other Liquids

By-pass purification of lubricating oils and other liquids is the subject of bulletin No. 2457 published by Sharples Centrifuges Ltd., Doman Road, Camberley, Surrey. A mathematical treatment is given for the problem of by-pass purification, followed by a discussion of the batch purification of liquids and a comparison of the effectiveness of circulatory batch purification with two-vessel batch purification. Mention is made of the optimum throughput for operation of a centrifuge or in fact any type of clarifying purifier. It is shown that for oil purification problems the high efficiency tubular bowl centrifuge is to be preferred to the use of the disc type machine.

### Counter Batchers

TCB counter batchers, the latest addition to the range of transistor machine controllers manufactured by Gate Electronics Ltd., Tudor Grove, London E9, are described in a leaflet issued by the company. The units consist of an amplifier, the necessary number of dekatron decade units and a coincidence and relay unit. They operate from a perception head which may take the form of a photo-electric cell and lamp, an electromagnetic pick-off or any electro-mechanical switch. Conventional valves and mechanical drum counters have been replaced with transistors.

### Laboratory Mantles

Isopad Ltd., Barnet-by-Pass, Boreham Wood, Herts, have published a new catalogue covering their range of laboratory mantles. Among new lines included are micro mantles for flasks from 5 to 50 ml, and multisize control units.

### Rotary High Vacuum Pumps

The Speedivac range of rotary high vacuum pumps is described and illustrated in a new catalogue produced by Edwards High Vacuum Ltd., Manor Royal, Crawley. Included are air ballast pumps capable of handling condensable vapours (for laboratory use); unballasted

pumps for use on clean vacuum systems and giving slightly higher vacuum (for physicists and electronic workers); and a new 'silent' pump for hospital use. Accessories available are also described.

### Electronic Instruments

Electronic instruments for the measurement of sound, noise and vibration, for non-destructive testing, pulse/time techniques and static neutralisation are described in a new catalogue available from A. L. Cawkell, Southall, Middlesex.

### Non-aqueous Titrimetry

THE SECOND edition of 'Titration in Non-aqueous Solvents' by A. H. Beckett and E. H. Tingley has been published by British Drug Houses Ltd., Poole, Dorset.

After a brief discussion of the theory of the method, the authors go on to describe apparatus and reagents. The properties of suitable titrants are considered and experimental procedures for a wide range of substances are described.

There are 97 references to the original literature and 15 review articles are listed.

### Cellobond Resins Described

Three information sheets on the range of Cellobond resins have been published by British Resin Products Ltd., Devonshire House, Piccadilly, London W1. The information sheets are Nos. P104, P105 and P106 and they cover resins AX 2660, AX2623 and AX 2652 respectively. Properties for all three resins are described and suitable uses are recommended.

### Technical Bulletin Describes New US Fungicide

A technical bulletin issued by Olin Mathieson Chemical Corp., of New York, describes Terraclor, a new fungicide recommended for the control of a number of crop diseases, primarily certain soil-borne types. Terraclor is Olin Mathieson's registered trade mark for pentachloronitrobenzene. It is available in various commercial formulations, as dust, wettable powders and emulsifiable concentrates. Said to be compatible with all insecticides and fungicides with a pH of 7 or below, which are similar in formulation, Terraclor is claimed to be highly stable, relatively non-poisonous, and to have a long residual. The company say there is no problem of phytotoxicity when Terraclor is used according to recommended rates and methods of application. Residues on food crops are below 0.1 p.p.m. The fungicide can be broadcast or dusted in the row with suitable applicators, and conventional equipment can be used for spray application. Terraclor is stated to be non-corrosive.

### Will

DR. ROBERT DUNCOMBE ABELL, head of the chemistry department at Bradford Technical College from 1919 to 1939, who after his retirement worked for a short period at Kershaws (Chemist) Ltd., Leeds, and as a research chemist at Avro aircraft factory, Yeovil, left £1,902.

● **MR. F. S. MORTIMER**, manager of industrial and public relations of Monsanto Chemicals Ltd., will retire on 30 June after 29 years' service. He joined the company in 1923. In 1929 he was responsible for the formation of the export department and was made export manager. In 1940 he was also appointed joint assistant sales manager and a year later became assistant general manager and assistant to the managing director. He was appointed manager of industrial and public relations in 1947.

● **MR. G. HELPS** and **MR. G. G. FARTHING**, joint managing directors, Humphreys and Glasgow Ltd., contracting engineers in the fuel, chemical and nuclear fields, were among 36 members of the company's staff who received gold watches on 5 June to mark 25 years service, or longer. Mr. Helps and Mr. Farthing have been with the company 37 and 35 years respectively.

● The honorary degree of doctor of laws was conferred on **MR. HENRY S. WINGATE**, president of the International Nickel Co. of Canada Ltd., at the annual convocation of the University of Manitoba.

● **DR. VICTOR R. DEITZ**, who is in charge of the US National Bureau of Standards laboratory work on the effects of solid adsorbents on particular gases, liquids and solutions, has been awarded a Guggenheim Fellowship and the US Department of Commerce silver medal. The fellowship will permit Dr. Deitz to continue his studies at the Imperial College of Science and Technology, London. Chairman-elect of the carbohydrate division of the American Chemical Society for 1958, Dr. Deitz gained his Ph.D. in physical chemistry at the Johns Hopkins University in 1932.

● **MR. W. F. OTTERSTROM** has been promoted to comptroller of Olin Mathieson Chemical Corporation, in succession to **MR. R. B. LEWIS**, who has resigned, but will continue as consultant to the corporation until 15 August. Mr. Otterstrom, formerly director for financial review, joined Olin Mathieson in August 1956 as assistant to the executive vice-president for finance.

● **MR. C. F. MERRIAM**, chairman of British Xylonite Co. and BX Plastics Ltd., has resigned from the boards of those companies, having reached the age of 70. **SIR LAURENCE MERRIAM** has been elected chairman of British Xylonite Co. and BX Plastics. **MR. C. E. M. COUBROUGH** has been appointed deputy chairman of British Xylonite and **COLONEL C. M. GLOVER** has been appointed managing director of BX Plastics and nominated to the board of Bexford.

● **MR. S. D. LYON**, assistant chief engineer of the dyestuffs division, Imperial Chemical Industries Ltd., has been appointed engineering director of Wilton Council. Since he joined ICI in 1946, Mr. Lyon has worked at Billingham on the first full scale nylon plant as a construction engineer, served as area engineer on the establishment and operation of the

## People in the NEWS

plant and has been connected with the Terylene and nylon plants at Wilton.

● **MR. J. O. ROBERTS** has been appointed manager of the Trimdon Grange, Co. Durham, coke-oven plant, owned by the National Coal Board. Mr. Roberts entered the industry as an assistant chemist with the Consett Iron Co. Ltd., and obtained an honours degree at King's College, Newcastle, in 1951.

● The honorary degree of Doctor of Science is to be conferred on **SIR ALEXANDER FLECK**, chairman of Imperial Chemical Industries Ltd., at London University on the Foundation day ceremony on 23 November.

● **MR. E. L. HARRISON**, director and sales manager, Quickfit and Quartz Ltd., Stone, Staffs, left by air for Amsterdam on 8 June en route for a trans-Atlantic tour during which he will visit distributors and study the North American market. Mr. Harrison expects to visit Seattle and Los Angeles, returning via Chicago, Toronto, New York, Boston and Montreal. He will cover the 12,000-mile journey in three weeks.

● **MR. W. MORGAN THOMPSON**, who has been appointed a director of Monsanto Chemicals Ltd., and will continue in office as sales director of the company, had previously been an alternate director since July 1956. Joining Monsanto in 1933, Mr. Thompson served the company in a series

of sales appointments and for a period was director of purchases. He was appointed sales director in August 1956.

● **DR. HORACE SMITH ISBELL**, one of the leading US carbohydrate chemists, is to take charge of the organic chemistry section of the National Bureau of Standards, Washington DC. His programme will include the development of methods for the production of carbon-14 and tritium labelled materials, stereochemistry, polarimetry, saccharimetry and utilisation of modern physico-chemical principles for rationalisation of the reactions of organic substances.

● Honorary officers of the chemical engineering group of the Society of Chemical Industry have been elected for 1957-58: chairman, **MR. R. F. STEWART**; hon. treasurer, **MR. F. A. GREENE**; hon. secretary, **MR. J. L. SWEETEN**; hon. editor, **MR. D. M. WILSON**; hon. recorder, **MR. H. W. THORP**.

## Obituary

**DR. LESLIE HERBERT LAMPITT**, director and chief chemist of J. Lyons and Co. Ltd., died on 3 June. Dr. Lampitt was to have given one of three congress lectures at the conference on modern analytical chemistry in industry organised by the Scottish section, Society for Analytical Chemistry, at St. Andrews University on 25 June; his paper on 'Analysis and food' will now be given by **DR. E. B. HUGHES**.

A former president of the Society of Chemical Industry, Dr. Lampitt had received the society's gold medal and was an international medallist in 1949. At the time of his death he was the hon. foreign secretary. Hon. treasurer of the International Union of Pure and Applied Chemistry, he was largely responsible for the fact that the Union held its recent conference in London on 'Surface activity'. Dr. Lampitt was also hon. secretary of the British National Committee for Chemistry.

**MR. EDGAR ALLAN SWIFT**, who founded Allied Colloids (Bradford) Ltd., importers of dyestuffs and chemical materials in 1909, died on 1 June at the age of 75. He was a member of the Society of Dyers and Colourists for 53 years.

## Foundry Services Plan Overseas Works

**SPEAKING** in London last week shortly after his return from a three-month tour of India, Kenya, South Africa, Australia, New Zealand, Japan and Hong Kong, **MR. R. A. MILLER**, sales director of Foundry Services Ltd., Long Acre, Nechells, Birmingham, said it was becoming increasingly difficult to expand trade in certain overseas countries because of import restrictions. His company had therefore decided to establish factories in those countries.

As a result of his visit to India, there was a strong possibility of forming a new company for the manufacture, sales and service of Fosco compounds. The new company was likely to have its centre in

or near Bombay, with Poona, possibly, as the site for the main factory.

In Australia, Mr. Miller consulted the company's agents and discussion led to a detailed study of the possibilities of manufacture, particularly in New South Wales and Victoria. Investigations have reached the stage of considering factory sites, details of erection and a study of the labour market.

Referring to his visit to Japan, Mr. Miller said the new factory at Ashimori, Okayama-ken, opened last year, was progressing well. The number of Japanese workpeople and technicians had been doubled and some 200 Japanese workpeople would ultimately be employed.

## TRADE NOTES

### PTFE Thin Walled Tubing

Production of polytetrafluoroethylene (Fluon) in a very fine state of division in aqueous suspension has made it possible, by coagulating the suspension, to extrude the material in thin walled tubing. This has the considerable advantage over thick walled tubing (which was all that could be made from the granular form of the polymer) of considerable flexibility and resistance to flexural fatigue. It is claimed that thin-walled p.t.f.e. tubes can handle a greater range of chemicals over a wider temperature range than any other flexible material (p.t.f.e. in basic form is unaffected by any known chemical except fluorine and molten alkali metals between about minus 50°F (-45°C) and 450°F (230°C). By virtue of its non-friction properties very small internal diameters can be used and the bore is easy to clean through.

These thin walled tubes are already widely used in the aircraft industry, where their long life is a significant factor in reducing maintenance costs. They are likely to prove valuable as flexible hose liners in many other applications in industry and in research laboratories.

Crane Packing Ltd., p.t.f.e. engineering division, Slough, Bucks, a Tube Investments Co. responsible for much of the pioneering work in the development of p.t.f.e. components, can now offer a wide range of p.t.f.e. thin walled tubing.

### ICI Save 50,000 Tons of Coal

Centralisation of process steam and electricity supplies at the ICI general chemicals division power station at Weston Point, Runcorn, following the installation of a 14,000 kW pass-out turbo-alternator, serving three works, is reported to have effected an annual saving of 50,000 tons of coal. The three works served are Castner-Kellner (adjoining the power station), Rocksavage (2,000 yards to the south), and the salt division works (1,500 yards to the north). They are all engaged in continuous processing.

The pass-out turbo-alternator feeding these pipelines has now been in full continuous operation 19 months. Under optimum load conditions the thermal efficiency of the set can reach over 80 per cent. Under present steam load conditions it is working at the rate of 60-70 per cent or approximately twice that possible in a good condensing set.

### Controlled Flame Cutter

Research co-operation lasting 12 months between the British Oxygen Co. and Ferranti Ltd. has resulted in advances in the field of computer controlled flame cutting machines. The new equipment which will result from this link-up is claimed to be the first of its kind in the world, and will have application in all branches of heavy engineering, particularly in atomic energy and chemical engineering.

A spokesman for both companies said: 'The new system which has evolved from this alliance between British Oxygen and Ferranti is essentially an application of

Ferranti machine tool control methods to new developments by British Oxygen in the field of oxygen cutting.'

As well as fully automatic operation of the profiling process, the system includes special features for controlling automatically the gas supplies to the cutting blow pipes, automatic ignition, pre-heat flame monitoring, nozzle-height sensing and cutter head rotation.

Demonstrations of the first experimental machine are expected to take place in the autumn of this year.

### Master Slave Manipulators

A set of master slave manipulators has been ordered by the Joint Establishment for Nuclear Research (Norway and Holland) from Savage and Parsons Ltd., Watford, Herts. The equipment is for use at Lillestrom in Norway.

A 15-ton consignment of lead shielding bricks and remote handling tools has been shipped to Aktiebolaget Atomenergi, Stockholm, and a set of remote handling tools has been ordered by Hans Palsbo AB, Finland, for exhibition at the forthcoming Helsinki Fair. Originally developed in conjunction with the UK Atomic Energy Authority, this equipment has been off the secret list for only three months.

### ICI Gift to Paisley Technical College

A cheque for £15,000 has been sent from ICI's Nobel division to the Paisley Technical College Extension Fund, which aims at raising £200,000 towards the estimated building cost of £500,000. The plans include chemistry and physics departments. Dr. A. D. Lees, the division's production director, represents the chemical industry on the college's board of Governors.

### Chamberlain Appoint Agents

Chamberlain Industries Ltd., contractors plant and plant hire specialists, Staffa Works, Staffa Road, Leyton, London E10, announce that they have appointed H. B. Rayler and Co. Ltd., Thomas Street Works, Hull Road, York, to act as their agents for the sale of the Jenbach portable diesel air compressor.

### UK Fertilisers Sought

Irmaos Iochpe SA, Caixa Postal 1870, Porto Elegre (Telegraphic address: Pinho-brasil) wish to import from the UK from 10 to 12,000 tons of fertilisers for the coming season. They seek quotations (by the end of June) for: mixed granulated fertilisers, formulas 6-30-6 and 10-30-10; triple superphosphate (granulated) 45/47 per cent (P2O5); ammonium sulphate 20.5/21.5 per cent N; potassium muriate 60/63 per cent K<sub>2</sub>O.

### New Branch Works

The Industrial Fan and Heater Co. Ltd., Birmingham 11, has opened a new branch works at Dawley Brook, Stourbridge, Worcestershire.

### Autoradiography Course to be Held at Harwell's Isotope School

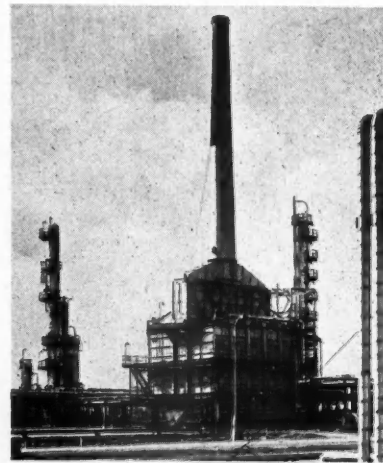
A COURSE on autoradiographic techniques will be held at the Isotope School, Atomic Energy Research Establishment, Harwell, from 22 to 26 July.

During the five-day course, lectures and demonstrations will be given to cover the basic principles of autoradiography and the interpretation of the results obtained. Demonstrations on stripping film and coating and squashing techniques will be followed by practical work on squash preparations for autoradiography and on the processing and staining of autoradiographs using normal and phase contrast microscopes.

Application forms for the limited number of places available on the course should be sent to the Isotope School as soon as possible. The course fee is £10. Application forms and more detailed information can be obtained from the Isotope School, AERE Harwell, Nr. Didcot, Berks.

### Coryton Catalytic Reformer in Operation

AFTER standing idle since it was completed last autumn, the catalytic reforming unit at Mobil Oil Co.'s Coryton refinery is now in operation. Designed to improve the quality of high-octane petrol,



Coryton catalytic reformer

the unit was left standing idle after completion because of the Suez crisis and the resulting uncertainty of crude supplies which led to the rationing of products.

The catalytic reforming unit is designed to process 6,000 barrels a day of low-octane naphtha. It consists essentially of a pretreater for the removal of sulphur followed by three reactors in series containing a platinum catalyst.

### Courtaulds New Laboratories

Courtaulds Ltd. are shortly to open their new acetate and synthetic fibres research laboratories in Lockhurst Lane, Coventry. Building work is mostly completed and parts of the laboratories are now in use. The new block of buildings includes pilot plant facilities.

# NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 2s 6d including postage; annual subscription £6 6d.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

## ACCEPTANCES

Open to public inspection 17 July

Producing phenolic substances through treatment of chlorinated diphenyls and polyphenyls and substances obtained thereby. Progil. 779 221

Scrubbing carbon dioxide or other acid gas constituents from gases. Ruhrstahl AG. 779 387

Preparation of ethylene oxide. Chem-patents Inc. 779 102

Demetalling hydroformylation stage products. Gulf Oil Corp. 779 388

Stable solid diazonium compound and process for making it. Farbwerke Hoechst AG. [Addition to 779 917.] 779 389

2, 5-Dimethyl-1, 6-hexanediol and esters thereof. Rohm and Haas Co. 779 391

Coating compositions. Du Pont de Nemours, E. I., and Co. 778 935

Caps for liquid containers. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. 779 314

N-aminoalkyl derivatives of substituted iminodibenzyls. Geigy, J. R. AG. 778 936

Amide compounds. Parke, Davis and Co. 779 105

Compounds comprising substituted piperazinediones and acid and alkali metal salts thereof, and the preparation thereof. American Cyanamid Co. 779 317

Separating the d-(-)-threo-1-(p-nitrophenyl)-2-amino-1, 3 propanediol from the racemic compound. Istituto Sieroterapico Milanese Serafino Belfanti. 779 318

Veterinary medicines. Dow Chemical Co. 778 988

Gas mixture fractionation apparatus. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. 779 184

Therapeutic composition containing an N-benzhydryl-N'-benzyl piperazine derivative. Pfizer, C., and Co. Inc. 779 109

Production of polyethylene. Chemische Werke Hüls AG. 779 111

2-Benzenesulphonamido pyrimidines and their production. Aktieselskabet Grindstedveerket. 770 322

Oestrogenic compounds. Nepera Chemical Co. Inc. 778 940

Monoperoxyacetals and the preparation thereof. Hercules Powder Co. 779 323

Phthalocyanine vat dyes. General Aniline and Film Corp. 779 324

Refractory fibrous material. Carborundum Co. 779 442

Steroid compounds. Upjohn Co. (Divided out of 779 001.) 779 002

Trichloromethyl-sulphenic acid esters of cyclic oximides and their production. Farbenfabriken Bayer AG. 779 114

Benzene hexachloride. Stauffer Chemical Co. [Addition to 777 290.] 779 332

Dimethyl terephthalate. Vereinigte Glanzstoff-Fabriken AG. 779 299

Organic phosphorus-containing derivative, and compositions containing it. Soc. des Usines Chimiques Rhone-Poulenc. [Addition to 761 162.] 779 449

Refractory materials. Plessey Co. Ltd. (Cognate applications 13784/56 and 13785/56.) (Divided out of 779 128.) 779 129

Emulsions. Newton, Chambers and Co. Ltd. (Divided out of 778 901.) 778 903 and 778 904

Open to public inspection on 24 July

Furnaces for treating materials in suspension, especially for use in roasting sulphide ores. Chemiebau Dr. A. Zieren Ges. 779 871

Degradation products of tetracyclic terpenes. Ciba Ltd. 779 941

Granulation of fertilisers and the like. Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St.-Gobain, Chauny et Cirey. 779 811

Lubricant. Eso Research and Engineering Co. (Cognate application 12440.) 779 698

Polyazo-dyestuffs. Farbwerke Hoechst AG. 779 486 and 779 487

Dental therapeutic compositions. Warner-Lambert Pharmaceutical Co. 779 734

Pliable crease-resisting chemically insensitive membranes. Chemieprodukte Ges. 779 650

Production of seamless filled capsules. Trifax NV. 779 869

Water insoluble dyestuffs and a process for producing fast dyeings and prints therewith. Farbwerke Hoechst AG. 779 781

Liquid hydrocarbon fuels containing antiknock agents. Ethyl Corp. 779 814

Butadiene-1, 3. Polymer Corp. Ltd. 779 629

Hydrophenanthrene-carboxylic acids and derivatives thereof. Ciba Ltd. 779 735

Aluminium hydrocarbons. Ziegler, K. 779 873

Isolation of stable, highly purified gamma globulin preparations. Behringwerke AG. 779 493

Fibres and other structures based on polyvinyl alcohol. Farbwerke Hoechst AG. 779 815

Plant-growth regulating compositions. American Chemical Paint Co. 779 634

Organic compounds of aluminium. Ziegler, K. 779 874

Dispersions and a process for their manufacture. Farbwerke Hoechst AG. 779 782

Compounds of the steroid series by a process for the partial elimination of oxo groups. Ciba Ltd. 779 700

Liquid dispensing apparatus. Beck and Co. (Meters) Ltd. 779 736

Increasing the lubricating capacity of hydraulic fluids. Farbwerke Hoechst AG. 779 816

Compounds of the steroid series. Ciba Ltd. 779 987

Centrifugal device for treatment of solid, liquid or gaseous substances. Soc. L'Equipelements Industriels et Laitiers SA. 779 652

Centrifugal device for the treatment of solid, liquid or gaseous substances or mixtures of substances. Soc. d'Equipelements Industriels et Laitiers SA. 779 877 and 779 878

Water-soluble mordant azophthalocyanine dyestuffs and process of making them. Durand and Huguenin AG. 779 489

Monoazo-dyestuffs and process for making them. Ciba Ltd. 779 818

Liquid reaction products from vinyl esters and aldehydes. Wacker-Chemie Ges. 779 783

Process and plant for the production of gas. Linde, R. Von. 779 914

Organotitanium compounds. National Lead Co. 779 490

Metalliferous monoazo-dyestuffs. Ciba Ltd. 779 879

Functional derivatives of azo-dyestuffs containing sulphonie acid groups. Ciba Ltd. 779 880

Production of floor and leather polishes. Badische Anilin- und Soda-Fabrik AG. 779 990

Production of cellulose or cellulose containing material having acid properties. Pauling, H. 779 820

Water sterilisers. Slater, J., and Co. (Engineers) Ltd. 779 655

Adsorption of metal salts on neutral polymeric adsorbents. United Kingdom Atomic Energy Authority. 779 739

Production of formed products, such as filaments, fibres, ribbons and the like from synthetic linear high polymers with improved wearing properties. Veb Thüringisches Kunstfaserwerk W. Pieck Schwarza. 779 822

Edible carbohydrates. Hellbaum, A. A. 779 604

Sulphur dyestuffs, and their use. Geigy AG. 779 760

Filter bodies. British Celanese Ltd. (Cognate application 18797.) 779 835

Pyrazolone compounds. Farbwerke Hoechst AG. 779 703

Liquid containers. Imperial Chemical Industries Ltd. 779 660

Measurement of temperatures. Land Pyrometers Ltd. 779 456

Roasting sulphide ores. Chemiebau Dr. A. Zieren Ges. (Divided out of 778 871.) 779 872

Tetraalkyllead compounds. Ethyl Corp. [Addition to 724 155.] 779 823

Apparatus for continuous automatic measurement of quantity of a certain gas in a gas mixture. CKD-Dukla Narodni Podnik. 779 824

Cracking of coal/oil mixtures. Research Interests Ltd., and Blumner, E. 779 901

Improving oxidation resistance of hydrocarbon oils. Mond Nickel Co. Ltd. 779 825

Catalysts containing vanadium. Imperial Chemical Industries Ltd. 779 494

Skeletal glass catalysts. Imperial Chemical Industries Ltd. 779 495

Method of fluidising granular solid material and generating circulating currents within the fluidised mass. Stamicarbon NV. 779 826

Crystallisation of salt. Palmer Mann and Co. Ltd. 779 742

Manufacture of polymeric materials. Imperial Chemical Industries Ltd. 779 557

Platinum or palladium containing reforming catalyst. Atlantic Refining Co., and Grace, W. R. 779 497

Di-(p-substituted phenyl)-thioureas. Ciba Ltd. 779 861

Examining the distribution of liquids in sprays. Simon-Carves Ltd. 779 609

Gasoline composition. California Research Corp. 779 827

Substituted pyrimidines. Cassella Farbwerke Mainkur AG. 779 908

Pressure regulator for gaseous or liquid media. Teves, H., and Teves, E. A. (trading as Teves Maschinen- und Armaturenfabrik Komm.-Ges., A.). 779 909

Process for partial removal of oxo groups from steroid compounds. Ciba Ltd. 779 498

Vulcanisable composition for manufacture of silicone rubber. Farbenfabriken Bayer AG. 779 788

Purification of lanolines. Esperis SA. 779 790

Polyglycol ethers and their manufacture. Ciba Ltd. 779 829

Esters of acylated 3, 5-diaminotriiodobenzoic acid. Sterling Drug Inc. 779 500

Ethylenically unsaturated polyhydroxy-substituted polyesters, and compositions containing same. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. 779 838

Production of artificial filaments, fibres, threads and the like. Courtaulds Ltd. 779 502

Separation of liquids from liquids. Vauxhall Motors Ltd. 779 952

Production of foam rubber. Dunlop Rubber Co. Ltd. 779 917

Tetracycline antibiotic complexes. American Cyanamid Co. 779 504

Apparatus for producing seamless filled capsules. Trifax NV. (Divided out of 779 869.) 779 870

Preparation of rod-shaped bodies of crystalline material. Siemens-Schuckertwerke AG. 779 957

Treatment of liquid suspensions. Sunds Verkstad Aktiebolag. 779 796

Fluorescent stilbil ditriazole compounds and their use. Geigy, J. R., AG. 779 505

Fluorescent stilbil ditriazole compounds and their use. Geigy, J. R., AG. (Addition to 779 505.) 779 958

Diagnostic composition. Miles Laboratories Inc. 779 921

Economical utilisation of the exhaust-gases from calcination of bicarbonates, particularly sodium bicarbonate. Baumann, F. 779 718

Catalytic interesterification. Hedley, T., and Co. Ltd. 779 464

Quaternary ammonium anion-exchange resins. Rohm and Haas Co. 779 994

Anion-exchange resins containing weakly and strongly basic functional groups. Rohm and Haas Co. 779 995

Device for homogenising powdery or granular material. Nauta, J. E. 779 844

Production of sulphuric acid. Sterling Drug Inc. 779 506

4-Acyl-3:5-dioxypyrazolidines and methods for the production thereof. Erba Soc. per Azioni, C. 779 507

Producing sulphuric acid by the contact process. Metallges. AG. 779 537

Chlorination process. Ethyl Corp. 779 565

Hardening agents for epoxide resins. Chemische Werke Albert. 779 566

Dehydrochlorinating polychloroalkyl chlorosilanes. Union Carbide and Carbon Corp. 779 846

Production of grey vat dyestuffs of the benzanthrone series, and the production of olive-green vat dyestuffs therefrom. Farbenfabriken Bayer AG. 779 508

Method and apparatus for purifying gaseous fluids. Wrene, N. T. 779 847

Burner structure for mixing two gases such as a gasiform hydrocarbon and an oxygen-containing gas. Texaco Development Corp. 779 967

Processes for producing solid solutions. Western Electric Co. Inc. 779 509

Separating trivalent rare earths from one another. Fischer, W. 779 930

Alumina. Esso Research and Engineering Co. 779 771

Preparing silicon nitride articles by slip casting. Union Carbide Ltd. 779 474

Organic acid esters of cellulose. Celanese Corp. of America. 779 802

Production of ethers. Badische Anilin- und Soda-Fabrik AG. 779 849

Plates, sheets and like articles of a basis of high polymeric polymethylene terephthalates. Kalle and Co. AG. 779 687

Catalytic cracking feed stocks. Esso Research and Engineering Co. 779 850

Process for dyeing polyester fibres. Farbenfabriken Bayer AG. 779 803

Generating silicon tetrafluoride. Columbian Carbon Co. 779 804

Manufacture of compounds of the steroid series. Ciba Ltd. (Divided out of 779 987.) 779 988

Compounds of the steroid series. Ciba Ltd. (Divided out of 779 987.) 779 989

Aromatic diisocyanate-diisothiocyanate- and isocyanate-isothiocyanate-compounds and polymers obtained therefrom, and the preparation of such compounds and polymers. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. 779 806

Anti-corrosive surface coating agent for metals. Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler. 779 752

Means for carrying out bacteriological tests. Forg. F. J. 779 514

Antibiotic streptolydigin. Upjohn Co. 779 570

N-acylated derivatives of substituted iminodibenzyls. Geigy, J. R., AG. 779 623

Eliminating arsenic from arsenical manganese and iron ores. Institut de Recherches de la Siderurgie. 779 515

Moisture impermeability of butadiene resins. Esso Research and Engineering Co. 779 753

Catalyst for the combustion of dilute

gaseous hydrocarbon mixtures. Chem-patents Inc. 779 538

Preparation of olefin dichlorides. Union Carbide and Carbon Corp. 779 938

Thermal stabilisation of ethylene polymers. Monsanto Chemical Co. 779 807

Alkylsulphonyl-thiobenzoates. Merck and Co. Inc. 779 516

Plant-growth regulating compositions. American Chemical Paint Co. (Divided out of 779 634.) 779 635 and 779 636

Thiophosphoric acid esters and pesticidal preparations containing same. Farbwerke Hoechst AG. 779 808

Manufacture of glass. Compagnies Reunies des Glaces et Verres Speciaux du Nord de la France. 779 852

Production of coatings on titanium surfaces. American Chemical Paint Co. 779 979

Polymerisation of ethylene. Badische Anilin- und Soda-Fabrik AG. 779 540

Production of 2-chloroacrolein and derivatives thereof. Union Carbide and Carbon Corp. 779 519

Manufacture of acedanthrones. Ciba Ltd. 779 542

Preparation of phthalaldehyde acid from pentachloroxylene. Dow Chemical Co. 779 981

Glass composition. LOF Glass Fibers Co. 779 481

Polymers of vinyl chloride. United States Rubber Co. 779 854

#### AMENDED SPECIFICATION

High molecular weight linear polyesters from diol esters of terephthalic acid. Vereinigte Glanzstoff-Fabriken AG. 727 790

### Market Reports

#### QUIET TRADING DUE TO WHITSUNTIDE

**LONDON** The price position remains fairly stable on the industrial chemicals market and in most sections quotations are firm. Fresh buying on home account is perhaps a little quieter due to the interruption of the Whitsun holiday, but contract deliveries have been taken up in good quantities. Among the soda products there is a good call for the hyposulphites and chlorate of soda, and elsewhere there is a steady demand for formaldehyde, hydrogen peroxide, borax and boric acid. The usual seasonal falling off in the demand for fertilisers has been experienced.

The fall in the lead prices has again affected quotations for white lead and red lead which are quoted at £131 15s and £124 per ton respectively as from 7 June.

There is again little change on the coal-tar products market with the light distillates in fair request.

**MANCHESTER** Contract deliveries of heavy chemicals to Lancashire industrial users have been interrupted by the Whitsuntide holiday stoppages at numerous works, and there has been a similar reduction in the number of fresh inquiries dealt with on the Manchester market. Traders, however, are looking forward with confidence to an early resumption of the steady trading conditions that have been experienced for so long.

**GLASGOW** A much more active week has to be reported from the Scottish heavy chemical market. Trading has been very brisk and once again a varied range of chemicals have been in demand by a fairly wide cross section of the industry, particularly in the field of textile and heavy. On the agricultural side business has been well maintained and orders placed have been relevant to seasonal demands. Export also continues at a good level, with numerous inquiries being received. On the whole, prices have been firm.

#### For Your Diary

##### WEDNESDAY 19 JUNE

**SCI (Food Group)**—Sharnbrook, Beds: Unilever Ltd., Food Research Department. 9.5 a.m. train from St. Pancras. Visit to laboratories and estate.

##### THURSDAY 20 JUNE

**Royal Society**—London: Burlington House, Piccadilly W.1, 4.30 p.m. Bakerian lecture: 'Elementary particles' by C. F. Powell.

**SCI (Microbiology Group)**—Bristol: Long Ashton Research Station, 8.45 a.m. train from Paddington. Visit.

**Incorporated Plant Engineers**—Chester: Stafford Hotel, City Road, 7.15 p.m. 'New developments in chemical engineering materials' by E. Warde.

## Commercial News

# Boake, Roberts' Steps to Improve Business Bring Results

**G**ROUP untaxed profits of A. Boake, Roberts and Co. (Holdings) were £221,406 (£504,815). Final dividend is 11 per cent, making 15 per cent (same plus bonus of 2½ per cent). Profits attributable to holdings were £120,410 (£252,866).

Last November the board disclosed that compared with the same 1955 period, untaxed profits to the end of September were down from £254,000 to £59,000. The disappointing first six months are attributed in the main to cost increases which could not be recovered by raising selling prices. There also was an unexpected contraction in home sales.

Various steps have now been taken to improve business. As shown by the second half of the year accounts these measures have brought results.

### Simon-Carves Ltd.

Consolidated net profit of Simon-Carves Ltd. for 1956 before tax provisions of £686,781 (£613,931) was £1,374,024 (£1,385,041). Net profit after tax was £687,243 (£771,110). Final of 12½ per cent, making 20 per cent on increased ordinary last July (against equivalent of 16½ per cent).

In his annual statement, Mr. R. B. Potter, chairman, said that turnover rose by more than 10 per cent during 1956. The increased value of contracts obtained was spectacular and orders in hand at the year end were some 30 per cent greater than in December 1955.

In the chemical plant department, the emphasis was on exports and orders had been obtained for sulphuric acid plants in Australia, New Zealand, India and South Africa. Simon-Carves had also been appointed main contractors to Imperial Chemical Industries for the complete supply and erection of a new polythene factory to be operated by an ICI subsidiary in India. Chemical Engineering Wiltons Ltd. had 'continued to secure a good share of home orders for tar distillation plants,' plus orders in Europe and India.

### Courtaulds Ltd.

A £3 million fall in revenue to £15.16 million is reported by Courtaulds Ltd. for the year ended 31 March last. Consolidated profits fell by nearly £2 million to £8½ million and the balance dealt with by the parent was down from £7.8 million to £6.2 million. As indicated in April, the dividend is being maintained at 10 per cent.

Preliminary information shows that reduced profits in the home market were, in the main, confined to the continuous filament yarn section, while export markets were less profitable particularly with regard to fabrics.

Increasingly severe competition has been met with in the US and Canada by subsidiaries, with consequent reduction in profits.

The annual general meeting is on 17 July.

### Greeff-Chemicals Holdings Ltd.

Group profit of Greeff-Chemicals Holdings Ltd. for 1956, before tax, was £128,034 (£137,736). Profit after tax and transfers to revenue reserves in the subsidiary amounted to £49,659 (£47,897).

A final dividend of 11 per cent is recommended on ordinary, making 16 per cent on £500,000 ordinary capital. Interim for 1955 was 5 per cent on ordinary capital of £400,000, and final for that year was 11 per cent on increased ordinary. The recommendation now made thus amounts to an additional dividend of one per cent on the ordinary capital of £500,000.

In his chairman's address, Mr. S. B. Smith attributes the reduced group profit to slightly lower turnover, smaller profit margins, more severe competition and increased overheads.

Trading to date this year is on a slightly higher level than for the same period of 1956, but expenses continue to increase and trading conditions remain difficult.

Annual meeting will be held on 27 June.

### Forestal Land

Group net profit of the Forestal Land, Timber and Railway Co. Ltd., manufacturers of tanning extracts, for 1956 was £634,913 (£623,382). Dividend of 9 per cent (same) is declared on ordinary. Group sales improved in the second half of last year; the level achieved for 1956 was not appreciably below that of 1955. This year, sales have continued to improve.

### Reckitt and Colman

Marked progress at home and overseas is reported for 1956 by Reckitt and Colman Holdings Ltd. Profit totals £3,194,962 (£2,507,818).

New research and control laboratories attached to Kingston works in Hull are now in operation and the analgesic plant at Kingston works is being extended to cope with the anticipated future demand for Disprin and Codis.

Increase in sales overseas during 1956 compared with 1955 was 13 per cent. In fact some 60 per cent of total sales are made overseas and factories are now being built in Venezuela and Columbia. Largest overseas interests of Reckitt and Colman are located in North America which last year accounted for about 50

per cent of the company's whole trade abroad. Sales there increased by 11 per cent. New plant under construction at Sonderton, near Philadelphia, is expected to be in operation soon. In France, the company have recently bought a 12 acre site at Chantres, where building will begin shortly.

In planning future factories in Europe, Reckitt and Colman plan to take account of progress towards the Common Market and the proposed association in a European Free Trade Area.

### Aspro-Nicholas Ltd.

Trading profit and investment income of Aspro-Nicholas (formerly Aspro) Ltd., for the year ended 31 March was £610,574 (£759,683). Net group profit was £267,497 (£389,450). Dividend on ordinary is maintained at 24 per cent, with a fourth interim payment of 6 per cent.

### NEW COMPANIES

**AEROSOL TURBO LTD.** Capital £2,000. Manufacturers of and dealers in humidifiers, air filters etc. First directors: W. Alexander, G. S. Abbey, W. P. Hudson, R. B. Ambler. Registered office: 5/7 New York Road, Leeds 1.

**WESTO INDUSTRIAL PRODUCTS LTD.** Capital £1,000. Importers and exporters of and dealers in chemicals, minerals etc. First directors: H. Walter, S. Kuttner. Registered office: 5 Addison Avenue, London W11.

**REDMOND FLETCHER LTD.** Capital £100. Mechanical, electrical and chemical engineers etc. Subscribers (each with one share): M. G. H. Fletcher, A. R. Farrance. Solicitors: Stanley James and Co., 17 Shaftesbury Avenue, London W1.

**FLECON LTD.** Capital £1,000. To acquire any interests in any inventions in relation to the construction, fabrication or use of flexible containers and of any apparatus, equipment or accessories in connection therewith for the transport, shipment, handling or storage of oil or any other liquid, solid or gas etc. Directors: Hon. J. M. W. North, Sir Archibald V. Board, and Sir William J. F. North. Registered office: Clifton House, Euston Road, London NW1.

### MORTGAGES & CHARGES

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## OFFICIAL APPOINTMENTS

### CENTRAL ELECTRICITY AUTHORITY SOUTH EASTERN DIVISION

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Applications, stating age, qualifications and experience, should be addressed to the Station Superintendent, Croydon 'B' Generating Station, Central Electricity Authority, Beddington Farm Road, Croydon, Surrey, so as to arrive by 1 July, 1957, quoting reference (269).

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**CHEMIST** is required at the **ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL**, to control the **WATER TREATMENT and ANALYSIS SECTION.**

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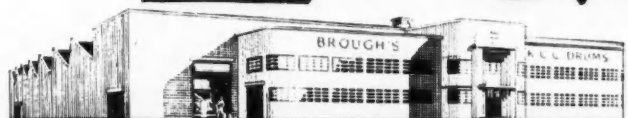
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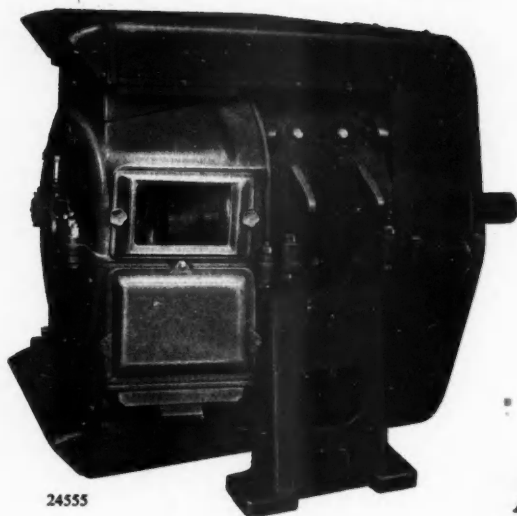
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